

THIRD
ANNUAL REPORT

OF THE
BOARD OF DIRECTORS

OF
The North Pennsylvania Railroad Company,

WITH THE
PROCEEDINGS OF THE ANNUAL MEETING OF STOCKHOLDERS

AND THE
REPORTS OF THE CHIEF ENGINEER.

JANUARY 14, 1856.

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1856.



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ANNUAL MEETING.

Office of the North Pennsylvania R. Road Co.

Philadelphia, January 14th, 1856.

Pursuant to notice, according to law, an Annual Meeting of the Stockholders of the North Pennsylvania Railroad Company was held this day, at the office of the Company.

On motion of Mr. William C. Kent, Mr. WILLIAM C. LUDWIG, was called to the chair, and EDWARD ARMSTRONG appointed Secretary.

Mr. Thomas S. Fernon, President of the Company, then submitted the annual report of the Board of Directors, which was read.

When on motion of Mr. Algernon S. Roberts, it was

Resolved, That the report be accepted and published.

The annual report of the Treasurer was then read and accepted, and ordered to be published.

The Secretary then read the report of the Chief Engineer, which, on motion of Mr. David Faust, was accepted.

The President of the Company offered the following resolution :—

Resolved, That the report of Wm. B. Foster, Esq., made November 19, 1852, the first report made by Edward Miller, Esq., Chief Engineer, dated April 30, 1853, his report dated June 6, 1853, on the Gwynedd cut-off line,—his general report, dated January 4th, 1854—his general report, dated December 28, 1854,—and his general report, dated January 11, 1856, now before this meeting, to which it has been presented by resolution of the Board of Directors, without any expression of opinion on the part of the Board, as to the contents of said Engineer's report, be, with the proceedings of this meeting, and all other official reports of the Chief Engineer, printed in one pamphlet for distribution among the stockholders at the earliest practicable day, and that the Secretary of this meeting is hereby authorized to superintend the printing and distribution of said reports in one pamphlet as aforesaid.

Which, on motion, was unanimously adopted.

The President of the Company offered the following preamble and resolution :—

WHEREAS, in the second section of the Act of Assembly incorporating this company, are these words, to wit :

“That the Capital Stock of the said Company shall consist of thirty thousand shares. *Provided*, That the said Company may, from time to time, by a vote of the Stockholders at a meeting called for the purpose, increase the Capital Stock if it shall be deemed necessary, to an amount sufficient to carry out the true intent and meaning of this Act.”

The original capital of this Company therefore consisted of 30,000 shares, amounting to \$2,500,000. Under the latter clause of the foregoing extract, the stockholders, at a meeting held July 10, 1854,

“*Resolved*, That the capital stock of the North Pennsylvania Railroad Company be and the same is hereby increased to, and shall consist of, one hundred and twenty thousand shares.”

Since the date of the passage of said resolution, the capital

stock of this Company has consisted of 120,000 shares, amounting to \$6,000,000.

The Company have transferred to Stockholders, 51,000 shares, amounting to \$2,575,000; leaving in her possession 69,000 shares, amounting to \$3,425,000, for delivery to persons "entitled to receive the same" for instalments paid, or in lieu of money for work done. In the delivery of certificates of stock, the cash subscriber and the contractor are treated alike in all respects; there is but one form of certificate, and but one kind of stockholder. Hence that provision of the charter which declares that "no share or shares transferred within sixty days next preceding any election, or general meeting of the Stockholders, shall entitle the holder or holders thereof to vote at any such election or general meeting;" is horizontal in its application. And being so, it is the obvious meaning of the law, which is based on common sense and common rights, that any share of stock, to entitle the holder thereof to vote at the election to be held this day, must have been owned by him sixty days preceding this day, to wit, Nov., 15, 1855, and must continue in his possession to and at the time of voting. Be it therefore,

Resolved, That the Judges of the election to be held this day are hereby requested not to receive or count any vote on any share of stock, the certificate whereof bears date subsequent to November 15, 1855, nor on any share transferred subsequent to that date.

And the motion being on their adoption, it was lost.

The Chairman then announced that Messrs. Franklin A. Comly, Joseph C. Yeager, and Solomon M. Bunn, had been appointed by the Board, Judges of the annual election.

When, on motion of Mr. Harry Conrad, it was

Resolved, That the meeting adjourn, for the purpose of going into an election for a President and ten Directors, to serve during the ensuing year.

EDWARD ARMSTRONG,

Secretary.

At a meeting of the Stockholders of the North Pennsylvania Railroad Company, held this day, the following persons were elected to serve as President and Directors for the ensuing year :—

PRESIDENT.

EDWARD MILLER.

DIRECTORS.

JOHN BROCK,	D. B. HINMAN,
JOHN WELSH,	J. LIVINGSTON ERRINGER,
J. GILLINGHAM FELL,	JOHN JORDAN, Jr.,
ALGERNON S. ROBERTS,	S. MORRIS WALN,
JOHN O. JAMES,	I. PEMBERTON HUTCHINSON.

FRANKLIN A. COMLY,
JOHN C. YEAGER,
SOLOMON M. BUNN,
Judges.

Office of the North Pennsylvania R. R. Co.,
Philadelphia, January 14, 1856.

THIRD ANNUAL REPORT.

To the Stockholders

of the North Pennsylvania Railroad Company.

GENTLEMEN :

The Report of the Board of Directors for the fiscal year, terminating November 30th, 1855, is respectfully presented.

On Monday, July 2d, 1855, the southern portion of your road, extending from Willow street, in this city, to Gwynedd, in Montgomery County, comprising about nineteen miles, was formally opened to public use.

The number of passengers conveyed and quantity of freight transported over your road, have fully equalled the expectations which were cherished before the opening took place, and afford, beyond doubt or question, a substantial basis for calculations of certain and regular annual increase.

Its entrance into the city, whether for freight or passenger purposes, is unsurpassed, while the country along its route abounds with scenes of natural beauty and productive wealth.

Mortgage Loan. — In anticipation of the inadequacy of proceeds of the subscriptions made to the capital stock of the Com-

pany, to meet the wants of the treasury for construction purposes, your Board, as the only alternative then available, decided to raise money by a loan secured by a mortgage on the Company's property and income. Accordingly, on the 4th day of April, 1855, a mortgage was executed in the sum of two millions five hundred thousand dollars.

Under date March 26th, 1855, a circular was issued by order of the Board of Directors, inviting bids for one million of the Company's mortgage bonds.

A second circular was issued by order of the Board of Directors, under date October 24th, 1855. Between these dates, and subsequent to the latter date, zealous and persevering efforts were made to negotiate the Company's loan by your Board, assisted by gentlemen of financial reputation and experience. The season, however, has been unpropitious, and consequently the measure of success has been short of our expectations.

The continuance of the war between the Allies and Russians, with short crops and high rates of interest in Europe, have operated conjointly to prevent the negotiation in a foreign market, of the bonds of American companies, whose roads are in progress of construction, even where, as in this case, the security is ample and unexceptionable.

In the American market, your Board have had to encounter the competition of American companies, owners of roads of established character in successful use. In our own local market, in addition to the bonds of such companies, the bonds of the city have been and are attainable, at prices below par, whereby our sales of bonds have been greatly restricted in this community.

These potent causes, it is submitted, have only to be considered, to be appreciated and understood; yet, notwithstanding all these serious drawbacks, there was issued to subscribers, who

make payment to December 1st, \$265,500 of mortgage bonds, at seventy-five per cent.; subscriptions made conditionally, amounting to more than two hundred thousand dollars, are upon lists in this office.

Proceeds of Subscriptions.—A very small proportion of the municipal bonds received in payment of subscriptions made to the capital stock of this Company, commanded par at time of issue. Most of the sales occurred subsequent to the enacting of municipal consolidation; since which event, city bonds have fluctuated between eighty-two per cent. and par. The net proceeds of the 28,000 shares, representing \$1,400,000 of municipal bonds sold by this Company, after deducting discount and commissions, was equal to ninety-one and a-half per cent. of the whole amount, to wit: \$1,280,884 64.

Municipal subscriptions, . -	28,000 shares,	\$1,400,000 00
Individual subscriptions, ⁱⁿ exclu-		
sive of contractors, to Dec.		
1, 1855, - - -	26,454 “	1,322,700 00
Subscriptions by banks and		
insurance companies, -	1,250 “	62,500 00
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Total, - -	55,704 shares,	\$2,785,200 00
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Work in progress.—North of Gwynedd station, as well upon the branch road to Doylestown, as upon the main road to the Lehigh River, the work of graduation upon the heavy and costly sections has been maintained in constant and uninterrupted progress.

Upon a number of the sections north of Gwynedd, the work of graduation is completed, and the road bed in readiness for the cross ties and rails, which may be laid down at such time as shall prepare the tracking for the cars over the whole route, almost

simultaneously with the completion of excavation upon sections twenty-one and thirty-six.

The Report of the Treasurer, herewith submitted, will exhibit the receipts and disbursements of the Treasury Department.

By order of the Board of Directors,

THOMAS SARGENT FERNON,
President North Penna. R. R. Co.

Company's Office,
Philada, January 9th, 1856.

TREASURER'S REPORT.

DEBITS.		CREDITS.	
Graduation, Bridges, and Masonry,	-	Instalments on Stock, -	-
Right of Way, and Fencing,-	-	Coupon Bonds sold, -	-
Superstructure, Rails, Chairs, Sills, &c.-	-	Bills Payable, -	-
Engineering Expenses,	-	Ground Rents and Mortgages, -	-
Cars, Locomotives, Stations, &c. -	-	Receipts from Passengers, \$25,420 97	
Superintendent's Department, (expenses)	-	“ “ Freight, 4,446 09	
Real Estate, -	-		29,867 06
Office Expenses, Printing, Advertising, and Salaries, -	-	Sundry Unsettled Accounts, -	4,187 36
Incidental Expenses and Damages, -	-		
Interest on Stock, -	-		
Interest and Discounts on Loans, -	-		
Cash, -	-		
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November 30, 1855.

WILLIAM WISTER, *Treasurer.*

THIRD ANNUAL REPORT

OF

THE CHIEF ENGINEER.

Engineer Department, North Penna. R. R.

To the Board of Directors.

GENTLEMEN:—I have already submitted, for the information of the Board, an estimate in detail, of the amount of work remaining to be done December 1st, 1855, on each section of the North Pennsylvania Road, and upon the branches which are in progress of construction; together with a general estimate of the amount of money required to complete the road to Bethlehem, Freemansburg and Doylestown, and to stock it for the present season's operations. The resolution of the Board, of December 26, authorizing an advance of prices upon section No. 8, makes it necessary to recapitulate the general items, which are accordingly submitted herewith, in Abstract No. 1.

The expenditures upon the road and branches, made through this department, to December 1, either upon estimates or vouchers, are shown in Abstract No. 2, which corresponds with the

ledger in my office, in the arrangement and subdivision of the different accounts. This may differ somewhat from the Treasurer's statement, in consequence of some of the estimates delivered to that officer, not having been called for by the parties entitled to receive them.

The whole estimated cost of the road and branches, including the rolling stock and buildings, supposed to be necessary for the present year, is shown in Abstract No. 3.

I regret deeply the excess in cost of the road, over my former estimates, and the longer time which has been required for its completion; both arising from the same general causes. These are as follows, viz:—

First.—The extreme difficulty of many of the sections on the road, arising from the unusual hardness of the rocks encountered, the great quantity of water met with in the deep cuttings, and the very unfavorable character of the past season, in which the amount of rain has been almost unprecedented.

Second.—The extremely high rates of labor, provisions, powder, and almost every other item which makes up the aggregate cost of a railroad.

Third.—The necessity under which the Board found themselves, a year since, of suspending all the lighter work on the road, on which amicable arrangements could be made with the contractors, and keeping back, to a considerable extent, the heavier sections, which occasioned the re-letting of a large amount of unfinished work, at an unfavorable time and at increased prices.

The first general estimate of the cost of the road made by me, was contained in my first annual report, at the close of 1853, and amounted to \$2,980,000.

The second, made at the close of the second year, 1854, was \$3,100,000.

The third, and present estimate, is \$3,464,096 27, being 14 per cent. more than the first report, and $10\frac{1}{2}$ per cent. more than the second report.

Partial reports on graduation, at the time of lettings, based necessarily upon imperfect data, were made prior to my first general report; but that was the first made upon full information, and also the first which was submitted to the stockholders, and printed for their use. At the time the first and second reports alluded to were made, great pains were taken to make them as full and accurate as possible; and uncertain items were enlarged, and additions made to the amounts obtained from the contract prices, with a view to secure this end. Had I estimated the graduation and masonry at the close of 1853, as high as it now appears that it will cost, the work then being nearly all under contract to good men, at prices so far below my calculations, I should have been considered by the Board and stockholders, as holding opinions utterly extravagant and injurious to the Company's prospects, and could not have defended myself from such an imputation.

I cannot avoid, nor do I desire to escape, the appropriate share of responsibility belonging to me in this matter. It is not the first time that I have been mistaken in my anticipations in regard to the cost of a difficult and important railroad, nor are such errors unusual in the history of the public works of this country or of Europe. In an untried geological formation, where the character of the rocks frequently changes, and especially in a "cross country" line, such errors of judgment are common, for even long experience and careful investigation give no claim to infallibility.

The difficulty of the Gwynnedd Cut is such as I have never witnessed during a long experience, nor do I believe that any engineer, from the external indications, could have anticipated such obstacles as are there encountered. They have been gradually developed during the progress of the work. Could I have foreseen them, the valley line would have been adopted,

notwithstanding its increased distance and curvature; and even as it was, I used the following language, in a special report to the Board on the subject: "The cost of the new line is, however, so formidable, that I should hesitate to recommend it to a corporation in danger of being crippled in means to carry on its operations. Of this, however, the Board are better judges than myself."

The Landis' Ridge Tunnel, on Section 36, at both ends, and also for the whole depth of the main working shaft and both air shafts, shows rock of a character by no means unfavorable, while between the main working shaft and the southern air shaft lies the hardest rock I ever encountered in a tunnel; the actual cost, under good management, being one-half greater than I have paid for a tunnel of considerable length through the hard conglomerates underlying the coal measures of Schuylkill county.

It can hardly be necessary for me to disclaim my responsibility for the short crop of 1854, the war prices of 1855, or the almost continuous rains of the same year.

The North Pennsylvania Railroad, between Philadelphia and Bethlehem, was designed to be a great main stem of communication, not only with the Valley of the Lehigh, but also with the three great anthracite coal-fields of Pennsylvania, and with Central and Western New York. It had, when commenced, one rival well advanced towards completion on the East, and another threatened it on the West. It was considered, therefore, by the Board, very important that this road should be of the first class in all respects, and as direct and free from curvature as possible. By the order of the Board it was to be graded for a broad gauge double track throughout, and entire confidence was felt by the friends of the enterprise, that funds would not be wanting to carry it out to completion, and to furnish it in the most liberal manner.

I have endeavored faithfully to perform my part in this great work, and believe that your road will in no respect be found wanting, when compared with the best railroads in America.

I believe that the evidences furnished by the portion of the track now completed, may be accepted as proof that a good road was necessary to that region; and that when opened to Bethlehem and Doylestown, the results will be such as to astonish the most sanguine friends of the road. Its excellence of character, assuring speed of transit and safety to life and limb, as well as economy of rolling stock, will be the guaranty of its success.

It can be completed to Bethlehem in August next.

Respectfully submitted,

EDW. MILLER,

Chief Engineer.

January 11, 1856.

Report of William B. Foster, Esq., Chief Engineer, to the President and Directors of the Philadelphia, Easton and Water-Gap Railroad Company.

GENTLEMEN :—

I have the honor to present you the following report, upon the surveys which have been in progress, under my direction, for the route of your road between Philadelphia and the Lehigh valley, at the mouth of Saucon; with such results as our examinations thus far afford, and an approximate estimate of cost upon the shortest and preferred route.

Not being familiar with the country over which the projected road would pass, and finding a diversity of opinion among gentlemen professing some knowledge of the various proposed routes, I concluded first to have a line traced over ground indicated by the map, as affording facilities for reaching the Lehigh, with but one main summit. This line is designated the "Perkiomen route."

Accordingly, an engineer corps was organized, under the

immediate direction of Mr. Philip L. Fox as principal assistant; and the instrumental examinations were commenced at the terminus of the Norristown railroad, near Stony creek, in the borough of Norristown. From this point, the line was traced, following the east bank of the Schuylkill river, up to near the mouth of Perkiomen; thence up the valley of the Perkiomen, to the mouth of one of its tributaries, called Swamp creek, and up the latter to its head, on the ridge which divides the waters running into the Schuylkill and the Delaware on the south, and those running into the Lehigh river northward.

As this route proved so much longer than one subsequently surveyed, I have not deemed it necessary to go into a minute description of it, nor to enter into detailed calculations of its probable cost.

If no more *direct* route could be found for your road, the line by the way of the Perkiomen would, so far as cost of construction and grades and curvature are concerned, present (excepting the main summit) no serious obstacle in the way of a good road. Indeed, as a whole, it may be regarded as a favorable route.

Approaching the dividing ridge, going northward, and following up Swamp creek, it is necessary, in order to conform to the face of the country, to rise with a gradient of seventy feet to the mile, for about one and a-half miles, which brings us to a depression in the ridge called "Beitler's Gap."

Here it requires a cut of forty feet, extreme depth, and running to zero at one thousand feet from the summit. In other words, it requires a cut of two thousand feet long, running from grade at each end, to forty feet cutting at the centre. The distance from Norristown to this summit, by the surveyed line, is $36\frac{3}{10}$ miles, and the rise six hundred and twenty-three feet. Deducting forty feet, which it is proposed to reduce the ridge, and we have 583 feet as the rise from the level of the railroad at Norristown, to grade at this summit. If we add 69 feet, which is the elevation, above tide, of the Norristown railroad at its terminus, we have the summit, at "Beitler's Gap," 652 feet

above mean tide at Philadelphia. From the north end of the summit cut, the line was carried along the face of the ridge, over favorable ground, passing southeast of the village of Coopersburg, and descending at the rate of 70 feet per mile, for about $1\frac{3}{4}$ miles; thence, for nearly two miles, gradients of 50 feet per mile may be adopted, and from this point down the Saucon valley, passing a little westward of Hellertown, grades of 20 to 35 feet may be adopted, as may best conform to the ground, and in a distance of a little less than twelve miles from the summit, at Beitler's Gap, we reach a connection with the located line of the Delaware, Lehigh, Schuylkill and Susquehanna railroad, at the mouth of Saucon creek, nearly opposite to Freemansburg.

The sum of ascent and descent on this route, is 998 feet, if we preserve ascending gradients from the starting point, at Norristown, to "Beitler's Gap;" but I apprehend that a *located line* would have two light summits, in addition to the principal one. Near the mouth of Perkiomen, and also near Sumneytown, it would probably be found advisable, in order to shorten the distance, to introduce light summits. If we add 100 feet of ascent and descent for these subordinate summits, we have 1098 feet as the sum of the ascents and descents from Norristown to the mouth of Saucon.

But in order that a comparison, in this respect, may be made with the shorter and preferred route, which will hereafter be noticed, I have examined the published profile of the Norristown railroad, and find that the sum of ascents and descents from Ninth and Green streets, in Philadelphia, to Stony creek, at Norristown, is 281 feet.

The total distance from Norristown to the mouth

of Saucon is	-	-	-	-	-	48 $\frac{1.5}{100}$ miles.
Add the length of the Norristown road,					-	18 do.

Total distance from 9th and Green streets, Phila-

delphia, to the Lehigh,		-	-	-	-	66 $\frac{1.5}{100}$ do.
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Total of ascents and descents from Norristown to	
Lehigh at mouth of Saucon, - - -	1,098 feet.
Add ascents and descents of Norristown railroad,	281 do.
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Total ascents and descents from Philadelphia to	
the Lehigh, at the mouth of Saucon, -	1,379 do.

As before observed, I have not deemed it necessary to enter into a detailed calculation as to the cost of construction of the Perkiomen line, as its greater length over the one subsequently surveyed, with considerations as to local traffic on the shorter and preferred route, give to the "Wissahickon line" advantages, which would not be compensated by such small difference in cost per mile as might be shown in favor of the former.

I shall now proceed to notice the features of the central or preferred route.

As the ground along the Saucon Valley for about ten miles from its mouth, is common to both the "Perkiomen" and "Wissahickon" routes, we commenced the surveys of the latter at a point southeast and near to Coopersburg. At this place, a depression is found in the ridge, called "Sims' Gap," and which proved to be 70 feet lower than where we had carried the line through at Beitler's Gap, about two miles westward. I may here remark, that, from representations made as to a depression in this ridge, in the vicinity of "Leights," I was induced to have a level carried along the crest of the ridge, in order to ascertain whether any better pass could be found.

The ridge or gap near "Leights" was ascertained to be thirty feet lower than the one at Sims', and approaching so much nearer the terminus of our line at the Lehigh, that it would be impracticable to descend from the ridge to our line below, without resorting to gradients entirely inadmissible.

The object sought to be gained by passing through the Gap at "Leights," was a line nearly approaching an *air line* drawn from the mouth of Saucon to Philadelphia. It is true that this

desideratum would be obtained, but what we require is a greater distance instead of less, in order to reduce the gradients ascending from the Lehigh to the first summit. The precise gradient which can be obtained in ascending from Saucon Valley to Sims' Gap, can only be determined after more careful surveys and a preliminary location.

I have directed my principal assistant (Mr. Fox) to locate *two* lines up this ascent—one with gradients of 52 feet to the mile, and one running as high as 70 feet per mile, in order to determine the relative cost of overcoming this summit with a heavier and a lighter cut.

From Sims' Gap southward, the line soon falls into the valley of a small branch of the Tohicon creek, which it pursues with a descending grade of 52 feet to the mile, for about three-quarters of a mile, when the fall in the stream and valley becomes quite moderate, and a descending grade of 13 feet to the mile may be adopted.

After leaving this branch of the Tohicon, the line is carried in a direct course over the "flat-lands," passing nearly one mile east of Quakertown, and is upon favorable ground until Bunker Hill is encountered, which requires an ascending grade southward of about forty feet to the mile, and a heavy cut through it. After passing Bunker Hill, we meet with the Rocky Ridge, which, although something of an obstacle, is not so serious as the one first passed. The next work of magnitude is a high embankment over the valley of Three Mile Run, which has its course eastward, between Rocky Hill and Landis' Ridge. When we have passed the Three Mile Run we reach Landis' Ridge, and here more minute surveys should be made, and a preliminary location, in order to determine the propriety of tunnelling. The surveyed line passes through this ridge, with a moderate cut, and descends westward along the face of the ridge with a gradient of 65 feet per mile, crossing the Bethlehem Turnpike north and near to Sellersville, thence down nearly a mile below the town to a suitable point for crossing the northeast branch of the Perkiomen.

From the surveys already made, we are led to believe that upon a location, a favorable tunnel line may be found through Landis' Ridge, which would not only reduce distance but enable us to descend to the northeast branch of the Perkiomen with a gradient not exceeding 53 feet to the mile, and at the same time place the road, in descending the southern slope of the ridge, on much more favorable ground. After crossing the North East Branch at about 30 feet above its surface, our line was carried up a small stream called "Derstein's Run," starting with a gradient ascending at the rate of 26 feet to the mile, which had to be increased to 52 feet per mile before we reached the summit of the ridge, and which is denominated "Nigger Hill." This high land, on the south side of the North East Branch, proved a more formidable obstacle than was anticipated. I am, however, satisfied, from a crest line run $1\frac{1}{2}$ miles eastward, and from a reconnoissance I made for some three or four miles still further eastward along the ridge, that we have traced a line over the lowest summit, and more nearly in our direct route than any that can be found. This summit can be overcome with an ascending grade southward not exceeding 40 feet to the mile, and without increasing distance over that determined from the experimental surveys.

From the summit of "Nigger Hill," we descend southward with a gradient of fifty-two feet to the mile, crossing the Skippack with a high embankment, and thence to Hatfield plains. Here for several miles we have favorable ground, with a straight line (which on a location may amount to five miles) passing about two miles west of Line Lexington.

From the Hatfield plains, we ascend with easy grades to the summit, which divides some of the small branches of the Neshamony from the waters of the Wissahickon.

From the Wissahickon summit, the line passes down the valley of that stream over reasonably favorable ground, and with moderately descending grades, until we reach Chestnut Hill. As the stream is crooked, it becomes necessary to cross it frequently, in order to preserve a proper alignment, but as it is not subject

to high freshets, and may generally be crossed with a single span of 100 feet, the bridging is not an expensive item.

After entering the narrow and confined gorge of the Wissahickon, at Chestnut Hill, and when the bluffs become formidable, we are forced on to the side hill over expensive ground, and in order to save abrupt curvature, make two short tunnels, one of 600 feet in length, and the other about 200 feet long. We are obliged to ascend with a moderate gradient to meet the level of the old graded road bed, which was formerly made, from the present terminus of the Germantown road over to the east bank of the Wissahickon. Arriving at this point, the line curves round through a heavy rock cut, and is carried along this old graded way, to the terminus of the Germantown railroad. Here the question arises, whether to connect with the Germantown road, or, passing about three-quarters of a mile parallel and in close proximity to it, diverge from it eastwardly, and pass down the valley of the Wingohocking to a terminus in the upper part of the city. An independent line to the city may be thus obtained, and the line of the road so located that a *branch* to tide water in the upper part of Richmond may be made at a future day, when the trade requires it. From the point on the Wissahickon where we diverged from it to make the connection with the Germantown road, a line was surveyed down the stream, a distance of one and eight-tenths miles, to an intersection with the Norristown railroad near the "High Bridge." This route, for reaching a depot in the city, has no advantage in point of distance over that by the way of the Germantown road; while to reach the connection near the "High Bridge," we encounter one and eight-tenths miles of extremely heavy rock cutting and deep filling, and would be unavoidably subjected to a large amount of severe curvature. From the surveys of the route described, I have caused a profile to be made of the line, and have adopted gradients approximating as nearly as could be done (of course subject to considerable changes and modifications when a location is made), in order to ascertain quantities upon which to base an estimate of cost. The quantities thus ascertained from a mere preliminary survey,

are not entirely accurate, but I deem them sufficiently close approximations to enable me to submit the following estimate of the cost of your road with a good degree of confidence.

The average cost per mile I make \$27,101, or for the whole distance from the upper part of the city of Philadelphia to the Lehigh at the mouth of the Saucon, $58\frac{4}{10}$ miles, the aggregate sum of \$1,582,715. If it should not be deemed important for the present to seek an independent line to the city limits, and a connection should be formed with the Germantown railroad, a deduction of at least \$150,000 may be made from the foregoing estimate, leaving \$1,432,715 as the cost of, say 52 miles of road, reaching from Germantown to the Lehigh at the mouth of Saucon. Upon a careful location of this work, the distance may possibly be reduced one mile, leaving 51 miles as the length of the road, but it is proper to remark that any reduction of distance from our surveyed line, will be an improvement to the road, but will not effect a saving in the aggregate cost of graduation.

By the "Wissahickon" route, the total of ascents, from the Delaware river at Richmond, will be 890 feet, and the sum of the descents, to reach the level of the grade at the mouth of Saucon, is 698 feet.

On no part of the surveyed route do we encounter sharp curvatures, and, as a general rule, the curves will have large radii, presenting no great obstruction to the rapid transit of trains. I believe that a location may be had with nearly two-thirds of the distance straight line. In regard to the grades opposed to the trade southward, with the exception of the first summit from the Lehigh, and which is common to the "Perkiomen" and "Wissahickon" routes, we shall encounter none exceeding 40 feet to the mile, while the Norristown road has grades of only seven feet to the mile less (or 33 feet) in the same direction. By this comparison of the grades opposed to the heavy trade, it is seen that the advantage of the Perkiomen route, in this respect, will not compensate for the increased distance over the "Wissahickon," or preferred route. I may mention here, that the estimate of cost is for a *double track*,

graded and bridged, and a single track laid with rails of 64 lbs. per lineal yard, well ballasted, and an allinum of three miles of track for sidings and turnouts. It also includes the cost of the necessary wood and water stations, and everything necessary to prepare the road for use of cars.

The right of way and land damage, nor stock for the road, are not included.

The surveys, thus far, have only been extended to the Lehigh river, but if a connection cannot be formed upon equitable terms with the road of the "Delaware, Lehigh, Schuylkill and Susquehanna" Company near to Freemansburg, your road may be extended down the Lehigh to Easton, and thence up to the Water Gap on the Delaware, or up the Lehigh Valley, as subsequent examinations or considerations of policy may dictate.

The road could, in my judgment, be extended to Easton (a distance of about ten miles,) at about the same average cost per mile as has been estimated for that portion between Philadelphia and the Lehigh River.

The engineer corps is now engaged, under my instructions, in examining a line, diverging from the Saucon Valley some distance up, and reaching a point higher up the river, in the direction of Bethlehem, and a line will also be run over the South Mountain, to ascertain the feasibility of reaching Allentown by a shorter route than up the Lehigh from the mouth of the Saucon. As soon as the result of these surveys is ascertained, it will be communicated to your Board.

I presume it is scarcely necessary for me to swell this report by any remarks upon the importance, as a matter of self-preservation, of constructing a railroad from Philadelphia to the Lehigh, and to the Delaware, at Easton. Of the magnitude and value of the trade of those regions, the gentlemen composing your Board are fully aware, and they are also aware that with the Central Railroad of New Jersey, now in operation to Easton, and when the Delaware, Lehigh, Schuylkill and Susquehanna Railroad shall be completed up the Lehigh Valley, that the whole of this valuable trade must be diverted to the city of New York.

I would, however, remark, that if your road were only extended to the Lehigh Valley, and to the town of Easton, that it would enjoy an immediate passenger and merchandise traffic, which, in connection with its local business, would make it a paying work, independently of the future prospect of a coal business, as well as an enlarged trade and travel when it shall ultimately have connection with the Wyoming and Lackawanna Valleys. The importance of these ultimate connections has been well stated in an address recently published in behalf of subscriptions to the stock of your road, and it is therefore unnecessary to recapitulate the arguments on the present occasion.

In addition to the surveys herein reported upon, I have made reconnoissance of a considerable portion of the country between Philadelphia and the Lehigh—sufficient to satisfy my judgment that the “Wissahicon” route, upon which the estimate is predicated, is the best one for the object you have in view. In company with your President and Secretary, I made a reconnoissance of a route, diverging from the Wissahickon, above the Springhouse Tavern, thence over to the waters of the Neshamony, up the north branch of that stream, and one of its tributaries, and over a dividing ridge on a small stream called “Deep Run.”

After striking Deep Run, we pursued it down to Tohicon Creek, thence up Tohicon Creek to the mouth of Haycock Run. From the mouth of the latter stream a line would have to be carried up to its head waters, and thence over a high summit to the waters of Durham Creek, at a point about four miles west of the Delaware River. The line would then have to pass up a branch of Durham Creek, to a summit between its waters and those running into the Saucon. A strong desire was expressed by several gentlemen interested in this route, to have it surveyed, but I was so entirely satisfied with the examination given to it, that I deem a survey a waste of time and money.

Indeed, in the progress of the surveys, our operations were materially retarded by the multiplicity of routes suggested by persons who were presumed to be familiar with the country, but unfortunately whose judgments were not well matured in relation to the best route upon which to locate a railroad.

I may remark, in conclusion, that my principal assistant is instructed to commence a *location* at the Saucon Valley, and proceed towards Philadelphia, by the route designated as the Wissahicon line—the location to be commenced as soon as the surveys in the direction of Bethlehem and Allentown are complete, and at such point as would be common to a terminus, or connection, at either the mouth of the Saucon, Allentown, or a point intermediate on the Lehigh—more in the direction of Bethlehem.

Very respectfully submitted,

WM. B. FOSTER, JR.,

November 19, 1852.

Chief Engineer.

REPORTS OF E. MILLER, Esq., CHIEF ENGINEER.

Engineer Department, April 30th, 1853.

THOS. S. FERNON, Esq.,

President Philad'a, Easton & Water Gap R. R. Company.

SIR:—The examinations I have made of the region between Philadelphia and the Lehigh river, and a careful consideration of its topography, confirm the conclusions of your former chief engineer, Mr. Foster, as to the proper route of your road from the Lehigh to White Marsh. From the latter point to Philadelphia, several routes have been located, but the calculations are incomplete, and arrangements for right of way may have an important bearing on the decision. Near the Lehigh, also, a final location cannot be made until it is ascertained whether an advantageous business connection can be arranged with the Lehigh Valley Rail Road Company.

From Hellertown to the vicinity of White Marsh, on the Wissahiekon, a distance of thirty-six and a half miles, the road

is ready for contract, and as a portion of the work is quite difficult, I recommend that it shall be commenced as soon as possible.

The route now recommended for your consideration and action, leaves the Lehigh by the Saucon Valley, which is followed to the summit at James' Gap—thence through the “flat lands” East of Quakertown, to Rocky Ridge at Coffle's Gap; thence through Landis' Ridge by a tunnel, the length of which will be about eighteen hundred feet, and across the north-east branch of Perkiomen, near Sellersbury. It there ascends Derstein's Run to the summit between Perkiomen, Skippack and Neshaminy, and crosses Hatfield Plains to the Wissahickon, the valley of which is pursued to the vicinity of White Marsh, where all the lines which will require future consideration, will converge.

No line varying materially from this can be obtained, except those by the Perkiomen and Delaware, which are not admissible on account of their greatly increased length. An Air Line would be generally east of our location, but by diverging from the straight course, we avoid the very broken and difficult ground produced by the branches of the Neshaminy and Tohickon, obtaining across the extreme heads of those streams two straight lines, each of which is five miles long.

An estimate of the cost of the graduation and bridges, with the tables of gradients and curvatures, is herewith submitted.

It will be seen that the proportion of straight to curved lines exceeds three to one, and that there will be no curvature of less than 1,637 feet radius. The whole cost of the work now proposed to be contracted for is estimated at \$735,575, or \$20,153 per mile. The estimates are intended to be very liberal, and to cover the graduation and bridging for a first class double track road, without temporary structures, the bridges to be stone, brick or iron.

The cost of the remaining distance between here and the Lehigh, will not exceed the average per mile of that now before you.

The whole distance from Philadelphia to the Lehigh will not exceed 55 miles.

The maximum gradient ascending southward, the direction of the heavy tonnage is 52.8-10 feet per mile on straight lines. This will be required only at two points—the head of the Saucon and the ascent of Derstein's Run. Descending southward, the steepest gradient is 60 feet per mile, also at two places.

The country through which your road passes is healthy, populous, and very productive. It abounds in mineral and agricultural wealth; and I feel no doubt that the stock would be an excellent one, even if the railroad should terminate at the mouth of the Saucon. Very few roads will equal it in local business. I need not dwell upon its necessity to Philadelphia, nor upon the value of the regions beyond, which will seek it as their grand trunk line; for I believe all are now convinced of this, and that it cannot fail to be appreciated and fostered as one of the most important avenues which Philadelphia has still to open.

Very respectfully,

EDW'D MILLER.

Chief Engineer.

ESTIMATES.

*From "Sandy Run" to Hellertown—Philadelphia, Easton
and Water Gap Railroad, April 30th, 1853.*

SECTION No. 15. 5,500 feet long.

25,500 cubic yards earth excavation, @ \$	16	\$4,080
24,800 Do Embankment	16	3,968
160 Perches rectangular culvert wall,	2 00	320
100 Do Arch do	4 50	450
950 Do Bridge masonry,	4 50	4,275
150 Feet lineal bridge superstructure,	32 00	4,800
	<u> </u>	<u> </u> \$17,893

SECTION No. 16. 5,300 feet long.

9,300 cubic yards earth excavation, @ \$	16	\$1,488	
21,500 Do Embankment,	17	3,655	
150 Perches arch culvert masonry,	4 00	600	
200 Do Rectangular do	2 00	400	
	<u> </u>	<u> </u>	6,143

SECTION NO. 17. 5,400 feet long.

24,900 cubic yards earth excavation, @ \$	16	\$3,984	
5,700 do rock do	50	2,850	
51,500 do embankment,	17	9,367	
140 perches rectang. culvert masonry,	2 00	280	
	<u> </u>	<u> </u>	16,481

SECTION No. 18. 5,300 feet long.

21,300 cubic yards earth excavation, @ \$	16	\$3,408	
48,500 do embankment,	17	8,245	
220 perches arch culvert masonry,	5 00	1,100	
1,100 do bridge masonry,	4 50	4,950	
75 feet lincal bridge superstructure,	32 00	2,400	
	<u> </u>	<u> </u>	20,103

SECTION No. 19. 4,400 feet long.

26,400 cubic yards earth excavation, @ \$	17	\$4,488	
11,100 do embankment,	16	1,776	
50 perches rectang. culvert masonry,	2 00	100	
	<u> </u>	<u> </u>	6,364

SECTION No. 20. 5,300 feet long.

34,300 cubic yards earth excavation, @ \$	16	\$5,488	
32,100 do embankment,	16	5,136	
800 perches bridge masonry,	4 50	3,600	
120 feet lincal bridge superstructure,	32 00	3,840	
	<u> </u>	<u> </u>	18,064

SECTION No. 21. 4,900 feet long.

20,000 cubic yards earth excavation, @ \$	16	\$3,200	
19,100 do embankment,	16	3,056	
100 perches rectang. culvert masonry,	2 00	200	
	<u> </u>	<u> </u>	6,456

SECTION No. 22. 4,900 feet long.

5,900 cubic yards earth excavation, @ \$	16	\$	944	
7,700 do embankment,	16		1,232	
200 perches rectangular culvert wall,	2	00	400	
				2,576

SECTION No. 23. 4,600 feet long.

12,600 cubic yards earth excavation, @ \$	16	\$	2,016	
10,800 do embankment,	16		1,728	
				3,744

SECTION No. 24. 4,900 feet long.

13,700 cubic yards earth excavation, @ \$	16	\$	2,192	
11,300 do embankment,	16		1,808	
252 perches rectangular culvert wall,	2	00	504	
				4,504

SECTION No. 25. 5,300 feet long.

7,500 cubic yards earth excavation, @ \$	16	\$	1,200	
19,600 do embankment,	16		3,136	
120 perches rectangular culvert wall,	2	00	240	
				4,576

SECTION No. 26. 4,500 feet long.

3,300 cubic yards earth excavation, @ \$	16	\$	528	
25,200 do embankment,	18		4,536	
220 perches arch culvert masonry,	4	50	998	
100 do rectangular do	2	00	200	
				6,262

SECTION No. 27. 5,200 feet long.

11,500 cubic yards earth excavation, @ \$	16	\$	1,840	
12,500 do embankment,	16		2,000	
180 perches arch culvert wall,	5	00	900	
				4,740

SECTION No. 28. 5,300 feet long.

18,500 cubic yards earth excavation, @ \$	16		2,960	
18,000 do embankment,	16		2,880	
180 perches rectangular culvert wall,	2	00	360	
				6,200

SECTION No. 29. 4,400 feet long.

3,900 cubic yards earth excavation, @ \$ 16	\$ 624	
7,800 do embankment, 17	1,326	
100 perches rectangular culvert wall, 2 00	200	
	<u> </u>	<u> </u>
		2,150

SECTION No. 30. 6,300 feet long.

38,600 cubic yards earth excavation, @ \$ 16	\$ 6,173	
65,000 do rock do 50	32,500	
113,800 do embankment, 18	20,484	
425 perches arch culvert masonry, 5 00	2,125	
	<u> </u>	<u> </u>
		61,282

SECTION No. 31. 5,000 feet long.

12,000 cubic yards earth excavation, @ \$ 16	\$1,920	
6,000 do rock do 50	3,000	
19,300 do embankment, 16	3,088	
85 perches rectangular culvert wall, 2 00	170	
	<u> </u>	<u> </u>
		8,178

SECTION No. 32. 5,300 feet long.

17,700 cubic yards earth excavation, @ \$ 16	\$2,832	
31,600 do embankment, 17	5,372	
	<u> </u>	<u> </u>
		8,204

SECTION No. 33. 5,300 feet long.

43,300 cubic yards earth excavation, @ \$ 16	\$6,928	
10,000 do rock do 50	5,000	
73,700 do embankment, 16	11,792	
420 perches rectang. culvert masonry, 2 00	840	
456 do arch do 4 50	2,052	
	<u> </u>	<u> </u>
		26,612

SECTION No. 34. 3,582 feet long.

40,100	cubic yards earth excavation,	@ \$ 16	\$ 6,416	
21,800	do rock do	50	10,900	
69,900	do embankment,	18	12,582	
260	perches arch culvert wall,	4 50	1,170	
1,112	do bridge masonry,	4 50	5,004	
75	feet lineal bridge superstructure,	32 00	2,400	
		<hr/>	<hr/>	38,472

SECTION No. 35. 5,600 feet long.

36,400	cubic yards earth excavation,	@ \$ 16	5,824	
2,800	do rock do	50	1,400	
136,400	do embankment,	16	21,824	
100	perch. rectan'r culvert masonry,	2 00	200	
		<hr/>	<hr/>	29,248

SECTION No. 36. 6,800 feet long.

51,400	cubic yards rock excavation,	@ \$ 65	\$33,410	
30,000	do tunnel do	3 50	105,000	
94,600	do embankment,	17	16,082	
110	perches masonry in façade of			
	tunnel, - - - -	12 00	1,320	
360	do do arch of tunnel,	6 00	2,160	
150	do arch culvert wall,	4 50	675	
		<hr/>	<hr/>	158,647

SECTION No. 37. 6,890 feet long.

41,300	cubic yards earth excavation,	@ \$ 17	\$7,021	
19,100	do rock do	50	9,550	
11,200	do embankment,	14	1,568	
		<hr/>	<hr/>	18,139

SECTION No. 38. 4,900 feet long.

30,600	cubic yards earth excavation,	@ \$ 16	\$ 4,896	
61,400	do embankment,	17	10,438	
240	perches rectangular culvert wall,	2 00	480	
		<hr/>	<hr/>	15,914

SECTION No. 39. 6,000 feet long.

40,000 cubic yards earth excavation, @	\$ 16	\$8,400	
10,000 do rock do	60	6,000	
66,900 do embankment,	16	10,704	
320 perches rectangular culvert wall,	2 00	640	
	—	—	25,744

SECTION No. 40. 6,900 feet long.

6,900 cubic yards earth excavation, @	\$ 16	\$1,104	
30,600 do embankment,	17	5,202	
180 perches rectang. culvert masonry,	2 00	360	
260 do arch do	4 50	1,170	
	—	—	7,836

SECTION No. 41. 5,200 feet long.

10,000 cubic yards earth excavation, @	\$ 16	\$1,600	
24,200 do embankment,	17	4,114	
220 perches rectang. culvert masonry,	2 00	440	
	—	—	6,154

SECTION No. 42. 4,700 feet long.

10,200 cubic yards earth excavation, @	\$ 16	\$1,632	
14,600 do rock do	45	6,570	
48,900 do embankment,	17	8,313	
150 perches arch culvert masonry,	4 00	600	
	—	—	17,115

SECTION No. 43. 5,300 feet long.

10,000 cubic yards earth excavation, @	\$ 16	\$1,600	
11,500 do rock do	45	5,175	
23,100 do embankment,	16	3,696	
120 perches arch culvert masonry,	4 00	480	
	—	—	10,951

SECTION No. 44. 5,300 feet long.

10,800 cubic yards earth excavation, @	\$ 16	\$1,728	
23,000 do embankment,	16	3,680	
80 perches rectangular culvert,	2 00	160	
80 do arch do wall,	4 00	320	
9,900 cubic yards rock excavation,	60	5,940	
	—	—	11,828

SECTION No. 45. 5,400 feet long.

78,000 cubic yards earth excavation, @	\$ 17	\$13,260	
58,000 do rock do	80	46,400	
19,800 do embankment,	14	2,772	
	—	—	62,432

SECTION No. 46. 4,400 feet long.

11,400 cubic yards earth excavation, @	\$ 16	\$2,124	
31,400 do embankment,	16	5,024	
400 perches arch culvert masonry,	4 50	1,800	
	—	—	8,948

SECTION No. 47. 5,300 feet long.

15,900 cubic yards earth excavation, @	\$ 16	\$2,554	
21,800 do embankment,	16	3,488	
100 perches rectangular culvert wall,	2 00	200	
	—	—	6,242

SECTION No. 48. 7,100 feet long.

35,000 cubic yards earth excavation, @	\$ 16	\$5,600	
10,800 do rock do	50	5,400	
79,000 do embankment,	17	13,430	
260 perches arch culvert masonry,	4 50	1,170	
	—	—	25,600

SECTION No. 49. 5,300 feet long.

24,900 cubic yards earth excavation, @ \$ 16	\$3,984	
31,200 Do embankment, 16	4,992	
112 perches rectangular culvert wall, 2 00	224	
	<u> </u>	<u> </u>
		9,200

SECTION No. 50. 5,300 feet long.

10,000 cubic yards earth excavation, @ \$ 16	\$ 1,600	
38,000 do rock do 65	24,700	
40,500 do embankment, 14	5,670	
80 perches arch culvert wall, 4 00	320	
120 do rectangular do 2 00	240	
730 do bridge masonry, 4 50	3,285	
75 feet lineal bridge superstructure, 32 00	2,400	
	<u> </u>	<u> </u>
		38,215

SECTION No. 51. 5,200 feet long.

14,000 cubic yards earth excavation, @ \$ 16	\$2,224	
16,000 do rock do 50	8,000	
23,800 do embankment, 16	3,808	
80 perches arch culvert masonry, 4 00	320	
	<u> </u>	<u> </u>
		<u>14,352</u>

TABLE OF GRADES.

DISTANCE IN MILES.	ASCENDING IN FEET.		DESCENDING IN FEET.		TOTAL ASCENT.	TOTAL DESCENT.
	Per 100.	Per Mile.	Per 100.	Per Mile.		
4.715			LEVEL.			
0.568	0.17	9.00			5.112	
0.910	0.51	27.00			24.570	
0.815	0.55	29.00			23.635	
1.100	0.60	31.70			34.870	
0.835	0.673	35.50			29.642	
0.665	0.73	38.50			25.603	
0.380	0.76	40.00			15.200	
1.037	0.80	42.20			43.761	
0.965	0.88	46.46			44.833	
6.865	1.00	52.80			362.472	
0.625			0.207	10.90		6.812
0.625			0.222	11.70		7.312
0.530			0.29	15.00		7.950
1.250			0.41	21.60		27.000
1.175			0.448	25.60		30.080
0.625			0.60	31.70		19.812
0.590			0.614	32.40		19.116
0.350			0.64	33.80		11.830
0.670			0.72	38.00		25.460
0.500			0.74	39.00		19.500
1.212			0.76	40.10		48.601
1.231			0.80	42.20		51.948
5.445			1.00	52.80		287.496
0.242			1.02	53.80		13.019
0.275			1.06	55.96		15.389
0.355			1.08	57.00		20.235
1.895			1.140	60.20		114.079
36.540	Miles.				609.698	725.639

Estimated from the Saucon to Sandy Run.

TABLE OF CURVATURE.

DEFLECTION.	RADIUS IN FEET.	DEGREES.	LENGTH OF CURVE IN MILES.
1½°	3820	14° 30'	0.183
2°	2865	190° 42'	1.806
2½°	2292	157° 59'	1.194
3°	1910	577° 54'	4.012
3½°	1637	245° 55'	1.743
		1320° 51'	8.938
		Straight line,	27.604
		Total in Miles,	36.542

RECAPITULATION.

Section	No. 15,	-	-	-	-	\$17,893
Do	" 16,	-	-	-	-	6,143
Do	" 17,	-	-	-	-	16,481
Do	" 18,	-	-	-	-	20,103
Do	" 19,	-	-	-	-	6,364
Do	" 20,	-	-	-	-	18,064
Do	" 21,	-	-	-	-	6,456
Do	" 22,	-	-	-	-	2,576
Do	" 23,	-	-	-	-	3,744
Do	" 24,	-	-	-	-	4,504
Do	" 25,	-	-	-	-	4,576
Do	" 26,	-	-	-	-	6,262
Do	" 27,	-	-	-	-	4,746
Do	" 28,	-	-	-	-	6,200
Do	" 29,	-	-	-	-	2,150
Do	" 30,	-	-	-	-	61,282
Do	" 31,	-	-	-	-	8,178
Do	" 32,	-	-	-	-	8,204
Do	" 33,	-	-	-	-	26,612
Do	" 34,	-	-	-	-	38,472
Do	" 35,	-	-	-	-	29,248
Do	" 36,	-	-	-	-	158,647
Do	" 37,	-	-	-	-	18,139
Do	" 38,	-	-	-	-	15,914
Do	" 39,	-	-	-	-	25,744
Do	" 40,	-	-	-	-	7,836
Do	" 41,	-	-	-	-	6,154
Do	" 42,	-	-	-	-	17,115
Do	" 43,	-	-	-	-	10,951
Do	" 44,	-	-	-	-	11,828
Do	" 45,	-	-	-	-	62,432
Do	" 46,	-	-	-	-	8,948
Do	" 47,	-	-	-	-	6,242
Do	" 48,	-	-	-	-	25,600
Do	" 49,	-	-	-	-	9,200
Do	" 50,	-	-	-	-	38,215
Do	" 51,	-	-	-	-	14,352
						<hr/>
						\$735,575
						<hr/>
Average per mile,	20,153

Engineer Department, June 6th, 1853.

THOS. S. FERNON, Esq.,

President Philada., Easton & Water Gap R. R.

DEAR SIR: The decision in regard to the contracts south of section No. 30, was suspended in order to give an opportunity of investigating more fully the character of a line which I had projected in the vicinity of Gwynedd, in order to reduce curvature and distance. The following statements, together with the maps herewith submitted, will give the necessary information in regard to details.

The straight line across the Hatfield plains, formerly 25,800 feet long, will be increased to 32,400 feet, and then curving 21 degrees upon a radius of 11,460 feet, it passes into another tangent of 14,600 feet, running down the valley of Wissahickon. As a curve of this kind is practically equal to a straight line, this is almost the same as a tangent $9\frac{3}{4}$ miles long.

The new line saves 7,015 feet of distance and 259 degrees of curvature, of which latter a considerable amount was on a radius of 1,637 feet. It is very important to avoid curvature, at all times; but especially on a road like this, terminating in a great and growing city, and traversing a region healthy, fertile, populous, and unsurpassed for picturesque beauty of scenery. In addition to the great trade which must flow into our road from the Lehigh, Delaware and Susquehanna valleys, a local passenger business of great extent will accumulate upon the southern half of the main stem to the Lehigh, requiring numerous trains and frequent stoppages; and consequently making it very important to avoid all unnecessary curvature, both on the score of speed and safety.

Should the cut-off line be adopted, the shortest radius of curvature for twenty-five miles from Philadelphia will be 2,865 feet.

The saving of distance will tell in comparison with the Delaware and Perkiomen routes, the great advantage over them consisting in the directness of our road.

The cost of the new line is, however, so formidable, that I should hesitate to recommend it to a corporation in danger of being crippled for means to carry on its operations. Of this, the members of the Board are better judges than myself.

The cost of graduation and masonry is estimated at \$127,100 more than the old line, and even with two tracks laid, the excess of the new line will be \$100,500. It would be easy to show by calculation that the results obtained would justify this expenditure on a road of large traffic, but the practical results upon a great line with which we are all familiar, will perhaps be more satisfactory.

The following statement is accordingly taken from the Report of the Reading Railroad Company, for 1852 :

Repairs and renewals of road way,	(p. 6) - - -	\$124,596
Transportion of coal,	(p. 32) - -	583,827
Do merchandise,	do - -	58,692
Do passengers,	do - -	60,438
		<hr/>
		\$827,553
		<hr/>

This includes only the actual cost of maintaining the road, exclusive of bridges ; and the transportation on the main line, exclusive of branches. It is also exclusive of terminal and general expenses. Divided by 93 for the number of miles, it gives \$8,898 per mile per annum ; which is equal to a capital of \$148,300, the value of a mile saved on the Reading Road.

In the same proportion, the 7,015 feet saved at Gwynedd would amount to over \$197,000, and if the curvature be added, a result much more than double the estimated additional cost would be attained.

It is proper to remark that an ascending gradient in the direction of the heavy trade is required on the cut-off line, but as a similar gradient has to be encountered only half a mile off

in ascending to the Wissahickon summit, and as the additional elevation is quite moderate, it is not of practical importance.

I recommend the adoption of the cut-off line.

Very respectfully,

EDW. MILLER,

Chief Engineer.

*Engineer Department, Phila. Easton & Water Gap R. R.
Philadelphia, July 29, 1853.*

THOS. S. FERNON, ESQ.,

President Philada., Easton and Water Gap R. R.

SIR: The surveys and locations of all the routes which I consider necessary to be examined between this city and the portion of our road now under contract, are completed. The best line which can be obtained, in my judgment, is that which leaves the Wissahickon by the valley of Sandy Run, crosses the Bethlehem turnpike near Hirsh's tavern, $13\frac{1}{2}$ miles from Philadelphia by the turnpike; passes through Edge hill by a deep cut of 47 feet at the village of Edgehillville; and descends the Tacony to the vicinity of Shoemaker-town, where the Old York turnpike road is crossed. From this place to Bristol street, our line crosses the country, there being no water course in the proper direction. I need not say that this district is studded with beautiful villas, which has rendered the proper arrangement of the line difficult. The line passes sufficiently near to Milestown and Brantown to accommodate these villages.

As the right of way has not been settled south of Bristol street, I recommend the Board not to determine the line south of Section No. 8. From this place, we can form a connection with the Germantown road, and enter the city at Ninth street, or we can occupy any street or streets, which may be preferred, between Ninth and the Delaware. The cost of right of way, and the facilities for obtaining the necessary ground for the ter-

minal shops and stations, may influence the decision on this end of the line.

The location north of Bristol street has been carefully revised, and the reasons for adopting the route now recommended, appear to me conclusive. It is far less expensive than the Wissahickon route, much shorter, and much superior in curvature. It accommodates a district greatly needing railroad facilities, and avoids direct competition with existing railroads. Should the Wissahickon route be adopted, we must come into direct proximity with the Germantown road, and either connect with it, or dispute with it for its legitimate business. The latter would, of course, be contrary to the wishes of the Board; while, to connect with a road already possessing so large a passenger business, yearly increasing, would be very impolitic, as the trade and travel we anticipate, would soon be more than it could pass, in addition to its own, and we should be compelled to seek another approach, after delay had increased the difficulty of obtaining the right of way.

The proposed line is extremely favorable in point of curvature, no curve of less than 2,865 feet being admitted. Edge hill is overcome by a gradient of 42 feet per mile, in the direction of the heavy trade, which is 16 feet greater than would be necessary on the Wissahickon line; but as a similar gradient is used at the Wissahickon summit, and also near Gwynedd, it will not be very objectionable here. The graduation is more costly than I anticipated in my first report; but the importance of preserving an excellent line, in approaching a great city, will fully justify the expense.

The distance from Philadelphia to the Bethlehem turnpike, at Hirsh's, is as short by the railroad as by the turnpike. This must be considered a remarkable result, when the character of the country and the excellence of the line are taken into consideration.

The whole distance by our railroad, from a point corresponding with the commencement of the Germantown turnpike to

Bethlehem, will not exceed 55 miles. Between the same points, by the Trenton, Belvidere and Lehigh roads, the distance is 91 miles, and from Bethlehem to New York, by the Lehigh Valley and New Jersey Central Railroads, the distance is 90 miles.

The turnpike distance, between Philadelphia and Bethlehem, is 52 miles; the distance saved upon it being obtained by climbing over the South Mountain, which we avoid by following the Saucon.

An estimate of the cost of graduation and masonry, on sections 8 to 17, now proposed to be put under contract, is herewith submitted.

Very respectfully,

EDW. MILLER,

Chief Engineer.

Estimate of Sections 8 to 17, inclusive.

SECTION 8.

Rock excavation,	55,000 cubic yards, @	\$ 60	33,000
Other do	12,000 do	18	2,160
Embankment,	60,000 do	18	10,800
Rectangular drain,	300 perches,	2 75	825
Arch culvert,	250 do	5 50	1,375
Ballast,	2,000 cubic yards,	70	1,400
Total,			<u>\$49,560</u>

SECTION 9.

Rock excavation,	40,000 cubic yards,	@	\$ 55	22,000
Other do	10,000 do		16	1,600
Embankment,	45,000 do		16	7,200
Rectangular drain,	300 perches,		2 75	825
Arch culvert,	650 do		6 00	3,950
Ballast,	2,000 cubic yards,		70	1,400
Total,				<u>\$36,975</u>

SECTION 10.

Rock excavation,	33,000 cubic yards,	@	\$ 55	18,150
Other do	10,000 do		16	1,600
Embankment,	45,000 do		17	7,650
Rectangular drain,	360 perches,		2 75	990
2d class masonry,	400 do		4 00	1,600
Ballast,	2,000 cubic yards,		70	1,400
Bridge superstructure,	44 lineal feet,		12	528
Total,				<u>\$31,918</u>

SECTION 11.

Rock excavation,	25,000 cubic yards,	@	\$ 50	12,500
Other do	5,000 do		15	750
Embankment,	25,000 do		18	4,500
Rectangular drain,	200 perches,		2 50	500
Arch culvert,	650 do		5 50	3,575
Ballast,	2,000 cubic yards,		70	1,400
Total,				<u>\$23,225</u>

SECTION 12.

Rock excavation,	25,000 cubic yards,	@	\$ 52	13,000
Other do	8,000 do		16	1,280
Embankment,	15,000 do		15	2,250
Rectangular drain,	100 perches,		2 75	275
Ballast,	2,000 cubic yards,		70	1,400
Arch Culverts,	550 perches,		5 00	2,750
Total,				<u>\$20,955</u>

SECTION 13.

Rock excavation,	25,000 cubic yards,	@	\$ 50	12,500
Other do	14,000 do		16	2,240
Embankment,	20,000 do		15	3,000
Ballast,	2,000 do		70	1,400
Rectangular drain	300 perches,		2 75	825
				<u>\$19,965</u>

SECTION 14.

Rock excavation,	65,000 cubic yards,	@	\$ 60	39,000
Other do	25,000 do		16	4,000
Embankment	83,000 do		16	13,280
Ballast,	2,000 do		70	1,400
Rectangular drain,	100 perches,		2 75	275
Arch culvert,	300 do		5 50	1,650
2d class masonry,	200 do		4 00	800
Lumber,	50 M feet,		12	600
				<u>\$61,005</u>

SECTION 15.

Rock excavation,	25,000 cubic yards,	@ \$	55	13,750
Other do	17,000 do		16	2,720
Embankment,	50,000 do		15	7,500
Rectangular drain,	100 perches,		2 75	275
Arch culvert,	850 do		5 50	4,675
Ballast,	2000 do		70	1,400
Total,				<u>\$30,320</u>

SECTION 16.

Rock excavation,	32,000 cubic yards,	@ \$	55	17,600
Other do	8,000 do		17	1,320
Embankment,	40,000 do		15	6,000
Ballast,	2,000 do		70	1,400
Rectangular drain,	100 perches,		2 75	275
Arch culvert,	800 do		5 50	4,400
2d class masonry,	300 do		4 00	1,200
Bridge superstructure,	40 lineal feet,		10 00	400
Total,				<u>\$32,595</u>

SECTION 17.

Rock excavation,	12,000 cubic yards,	@ \$	55	6,600
Other do	7,000 do		17	1,190
Embankment,	20,000 do		15	3,000
Ballast,	2,000 do		70	1,400
Rectangular drain,	250 perches,		2 75	687
Total,				<u>\$12,877</u>

RECAPITULATION.

										Total Cost.
Section No. 8,	-	-	-	-	-	-	-	-	-	\$49,560
do " 9,	-	-	-	-	-	-	-	-	-	36,975
do " 10,	-	-	-	-	-	-	-	-	-	31,918
do " 11,	-	-	-	-	-	-	-	-	-	23,225
do " 12,	-	-	-	-	-	-	-	-	-	20,955
do " 13,	-	-	-	-	-	-	-	-	-	19,965
do " 14,	-	-	-	-	-	-	-	-	-	61,005
do " 15,	-	-	-	-	-	-	-	-	-	30,320
do " 16,	-	-	-	-	-	-	-	-	-	32,595
do " 17,	-	-	-	-	-	-	-	-	-	12,877
Total, - - - - -										<u>\$319,345</u>

Engineer Department, North Penna. R. R.

Philadelphia, Nov. 1, 1853.

THOS. S. FERNON, Esq.,

President North Penna. R. R. Co.

SIR : Several routes have been surveyed for the southern portion of the North Pennsylvania Railroad, but no location has hitherto been recommended, because the determination of the proper sites for shops and stations was necessarily and intimately connected with the approach to the city of Philadelphia.

The purchase of a block at Front and Willow streets, and of another upon Washington street, renders further delay unnecessary; and I therefore recommend the following route for the portion of the road yet undetermined. In comparing the different lines, the question of damages to property has received due consideration; and I believe that no other line can be obtained, which, with equal engineering merits, will do so little injury to landholders, as that now proposed.

Commencing at the southern end of section No. 8, our route follows the course of Bristol street, either occupying the centre of the street (which in that case will have to be widened on both

sides) or running parallel to it and in immediate contact on the eastern side, as may be found most advisable, when the land damages shall have been fully ascertained. The line of Bristol street is followed across the valley of the Wingohocking, which requires a culvert and large embankment, the materials for which will be procured from cuttings north and south of the stream. The line then passes, by gentle curves, through lands of S. Dickinson, and enters Fourth street, which it follows through the lots of the Franklin Building Association ; it then curves through land of Wright and others, crossing Gunner's Run and the Reading Railroad, into the centre of Washington street, which is followed to the termination of that street ; thence down Cadwalader to Second ; down Second to Germantown road ; down German-town road to Front, and down Front to Willow.

The Reading Railroad is crossed over head at such elevation as to avoid all interference.

The great width of Washington street, and its excellent gradients, adapt it admirably for the approach of an important railroad to a great city ; and as all the angles which have to be turned between it and Front street are obtuse, none of the street curves will be of an objectionable character.

The termination of the road at Front and Willow streets is in all respects most desirable ; and it is not the least of its recommendations, that the improvement of the Willow street railroad (now in efficient hands) will connect our depot with the railways in Broad street, Market street, and Ninth street, and through them with all the freight and passenger stations of all the railroads radiating from the city of Philadelphia, except the Trenton road, which can also be connected by a short link between their depot and Front street. Omnibus cars will doubtless be established, conveying passengers cheaply and rapidly between all these stations, and to all intermediate points in the city and districts.

The map in the Company's office indicates the features of the line now proposed, and, with the annexed estimate, renders further explanation unnecessary.

The work upon sections 4 and 6 is of such magnitude that it is proper to put them under contract, and to push them this winter, or as soon as the settlements for damages can be obtained. Most of the remaining work is light, and can stand until spring.

The difficulty of obtaining laborers has nearly ceased, and the sections in progress are gradually filling up with men. The average force returned during the month of October was 1,000 laborers, 60 mechanics, and 200 horses ; but the actual force at the close of the month was considerably above this average.

All the contracts from section 8 to 19 inclusive, have been well opened, and they are generally progressing as rapidly as I think it necessary they should be pushed at present. Between sections 36 and 52 inclusive, also, the sections are getting on well, except a few light jobs. Sections 21 and 36 limit the time at which the central portion of the road can be opened. Neither of these have been doing so well as I had expected and wished ; but the force on No. 21 has been much increased during the past two weeks, and efficient arrangements are in progress for keeping it stocked with men hereafter. The tunnel shaft on section 36 has given the contractors much trouble on account of water. Their arrangements for pumping and raising materials by horse-power were insufficient, and they are now preparing to effect the same object by steam. The shaft has been sunk below the crown of the tunnel, and the rock cutting at the south end will permit drifting to be commenced very soon.

The heavy sections between 21 and 36 are all in progress, but need not be pushed faster than will complete them simultaneously with these two.

Fifteen sections, viz: 20, 22, 23, 24, 25, 26, 28, 29, 31, 32, 38, 39, 41, 43, 49, are not yet commenced ; they are generally light, and most of them will not be commenced until next Spring. It is not necessary to push them now, and the interest upon their cost may as well be saved.

Respectfully submitted,

EDW. MILLER,

Chief Engineer.

Estimate of Sections No. 4 to 7 inclusive.

SECTION No. 7.—4,300 feet long.

Earth,	15,000 yards,	@	\$	16	2,400
Embankment,	40,000 do			18	7,200
Rectangular culvert,	440 perches,			3 00	1,320
					<hr/> \$19,920

SECTION No. 6.—3,000 feet long.

Earth,	50,000 yards,	@	\$	16	8,000
Embankment,	50,000 do			16	8,000
Arch Culvert,	2,000 perches,			6 00	12,000
					<hr/> 28,000

SECTION No. 5.—3,400 feet long.

Earth,	8,000 yards,	@	\$	16	1,280
Embankment,	10,000 do			16	1,600
Rectangular culvert,	300 perches,			3 00	900
					<hr/> 3,780

SECTION No. 4.—3,700 feet long.

Earth,	15,000 yards,	@	\$	16	2,400
Rock,	6,000 do			50	3,000
Embankment,	36,000 do			25	9,000
Arch culvert,	1,500 perches,			6 00	9,000
Rectangular culvert,	200 do			3 00	600
					<hr/> 24,000

Total, \$66,700

The above sections reach to the Reading Railroad.

First Annual Report of the Chief Engineer.—Presented at the Annual Meeting, held January 9, 1854.

THOMAS S. FERNON, Esq.,

President of North Pennsylvania Rail Road Company:

SIR:—The clear and able exposition of the objects and prospects of the North Pennsylvania Railroad, lately published by the Board of Directors, proves conclusively the importance of its early construction, its advantages over rival routes, and its commercial value to the stockholders, the city of Philadelphia, and the State of Pennsylvania. In view of this publication, it will be necessary for your engineer to make only a few professional remarks on these important topics.

The great water courses of Pennsylvania offer the topographical facilities necessary for the construction of the first class railways destined to develop the resources of the Commonwealth. The Reading Railroad follows the valley of the Schuylkill. The Pennsylvania Central Railroad occupies the valleys of the Susquehanna, Juniata, and the Conemaugh, which penetrate all the mountain ranges of the State except the main Allegheny. The proposed Sunbury and Erie road, when constructed, will follow the courses of the west branch of the Susquehanna and the Allegheny, with their tributaries, throughout nearly its whole length. In like manner, the Lehigh and the North Branch of the Susquehanna, indicate unmistakeably the proper course for a Great Northern Highway to Central and Western New York, to the Lakes, and to Canada West. At Waverly, the New York and Erie Railroad, which has followed the valleys of the Canisteo and Chemung in a south-easterly direction from Hornellsville, meets the State line of Pennsylvania; and from that point makes a considerable detour to the north, before it again reaches the State line at the Great Bend. Waverly is a thriving village of four years growth, having in that time attained

a population of about eighteen hundred inhabitants, mainly dependent upon the business furnished by Bradford County, Pennsylvania, to the New York and Erie Railroad. It lies partly in New York and partly in Pennsylvania, and is upon the promontory called Tioga Point, between the Chemung and Susquehanna rivers.

From this point west and north, as the map prepared to accompany this Company's exposition plainly shows, the New York and Erie Railroad, with all its branches and ramifications, appears to belong rather to a main trunk line down the Susquehanna, than to the Eastern division of the New York and Erie Railroad. And if the object of the New York and Erie Railroad Company had been merely to connect their metropolis with Western New York, by the best line which nature permitted, they should originally, without doubt, have occupied the valley of the North Branch from Pittston to Waverly, for it is the best route to New York as well as to Philadelphia. To test the truth of this assertion, let straight lines be drawn on the large State map of Pennsylvania, from Waverly to Philadelphia, and from Waverly to New York. It will be found that their lengths are nearly the same; Philadelphia being 160 miles distant, and New York 162. Pittston lies nearly half way between them, the course of the North Branch to that point being an average between the two. The air-line to Philadelphia passes through Athens, Wysox, Wyalusing, Mauch Chunk and Lehigh-ton, all points on our route. Towanda is only $2\frac{3}{4}$ miles from the air line; Tunkhannock, 12; Pittston, $13\frac{1}{4}$; Wilesbarre, 5; White Haven, 5; Rockport, $2\frac{1}{4}$; Penn Haven, $1\frac{2}{3}$; Allentown, $5\frac{1}{2}$, and Bethlehem, $10\frac{3}{4}$. The most distant point on our route, from the air-line, is $14\frac{1}{4}$ miles. I think these facts may be taken as sufficient evidence, that the Lehigh and North Branch valleys form a natural and obvious route to Philadelphia; the near coincidence of their courses with each other, and with the existing railroads of western New York, is indeed both remarkable and significant. The contrast with the New York routes, is very striking. If we

compare the New York and Erie Railroad alone, Port Deposit is $34\frac{1}{4}$ miles from the air-line, between Waverly and New York; and, except at the extreme termini, they nowhere approach each other. If we make the comparison with the route now in progress, by way of Great Bend, Seranton, the Delaware Water Gap, and the Central Jersey Road, we shall find that it crosses the air-line to New York once, but is $27\frac{1}{4}$ miles from it at the most distant point, while no part of the North Branch valley, above Pittston, is more than $16\frac{1}{2}$ miles from it. If, again, we compare the same line as a Philadelphia route, using the Belvidere and Trenton Railroads to our city, it will be seen, that at one point east of Binghampton, it is 38 miles from the air-line between Waverly and Philadelphia, being 24 miles further than the most distant point on our own line.

These facts speak for themselves; and as the *prima facie* evidence thus obtained is fully confirmed by our surveys, it is worthy of serious consideration, whether the prize for which New York has been willing to construct two railroads, both much longer, and vastly inferior to our own in character and local resources, is not of sufficient value to deserve the undivided patronage of our citizens.

If our rivals have not yet learned, that the true route to their own lake cities, and to the treasures of the western part of their own State, is in the valley of the North Branch, they must soon discover it; and should Philadelphia decline to occupy that valley now, under our charter, it is probable that she will never again have an opportunity to refuse. She has suffered Baltimore to seize upon the main Susquehanna river, and New York to take the first choice of ground in the Lehigh valley. These are two great highways which Philadelphia should have held and controlled, at any risk or expense which might have been necessary; and of all her commercial mistakes, she has made none greater than giving these keys of her proper treasures to her rivals. If she now yields the North Branch, and the contracted valley of the upper Lehigh, the divorcee of one half of the State from

Philadelphia may be formally pronounced, and our eyes closed to everything except the Schuylkill coal field, and the Pennsylvania Central road, with its western extensions. No railroad scheme is sure to be managed for the best interests of its constituents, if a rival controls an intermediate link in an important portion of the chain; but in this case, one favorable charter covers the entire ground to our very doors; no rival stands in the path, controlling any portion of the line; no foreign legislation can interfere with us, to the State border, where the numerous railroads of western and central New York will be eager to avail themselves of the advantages we shall be prepared to offer.

From Waverly, the Susquehanna pursues a generally direct course, until it reaches Pittston, where it enters the Wyoming valley, and turning a right angle, flows southwesterly to its junction with the West Branch, at Northumberland. This angle indicates the proper place for leaving the Susquehanna; and the single summit which divides it from the Lehigh being passed, the latter river follows the general direction already indicated, to Allentown, where, meeting the South Mountain, it also is deflected, and flows at right angles with its former course, to Easton. From a point as near the Allentown bend as the topography permits, which is at the gap made by the Saucon creek, through the South Mountain, the line leaves the Lehigh valley, and crosses the country to Philadelphia.

It is an important feature of our route, that every mountain range in the State is cut to its base by the streams we follow, except two, the Nescopeck and the Wilkesbarre or Second Mountain, which, in fact, form but one summit, as a level line is preserved between them. This summit lies between the great anthracite coal basins, and is 1,630 feet above tide water, requiring a gradient of $69\frac{7}{10}$ feet per mile to overcome it on the northern slope. This is the maximum gradient on the whole route, and is required at no other point; the steepest gradient elsewhere being 60 feet per mile. This is also the highest summit between Philadelphia and Buffalo. It is 47 feet lower than the Elk sum-

mit, and 349 feet lower than the Clarion summit, both on the Sunbury and Erie road, and is 531 feet lower than the Allegheny summit of the Pennsylvania Central road.

The Allegheny mountain, which, after leaving the West Branch, is known as the North mountain, Bald mountain, and Mahoopeny mountain, in different localities, is cut through by the North Branch of the Susquehanna, and therefore offers no impediment to the North Pennsylvania Railroad.

In order that no time may be lost in the examinations and locations upon so extended a line, several corps of engineers have been employed upon them, and a very large amount of labor has been performed. The field duties were not completed until December, and it has been consequently impracticable to prepare the estimates, which require a great deal of office work, in time for this report, except those of the southern division.

The character of the line, however, is highly satisfactory, as will be seen by the accompanying statements, which have been made from actual locations. The estimates will be submitted to the Board as soon as they can be prepared. The locations have been made with care throughout the entire distance from Philadelphia to Waverly, with the exception of about fourteen and a half miles between White Haven and the summit of Wilkesbarre mountain, for which distance the Wilkesbarre and White Haven Railroad, belonging to the Lehigh Coal and Navigation Company may be used, provided it can be purchased or leased on satisfactory terms. The estimates, however, will cover the cost of a new road for that distance, as no such arrangement may be practicable. That road is now valueless to the Lehigh company, and will remain a burthen upon their finances, if we should construct an independent line between the Lehigh and Susquehanna.

We have also, during the past season, located a branch railroad to Doylestown, one to Easton, and a loop line from the summit of the Wilkesbarre mountain, passing near Wilkesbarre, Kingston and Troy, to Pittston. The latter is intended for the development of the coal fields of the Wyoming Valley. Experimental surveys have also been made for extending the Easton

branch to the Delaware Water Gap; but the lateness of the season prevented us from completing the location along the Delaware. These branches are important features of our great scheme, and while developing the extensive mineral and agricultural regions which they traverse, will also add largely to the revenues of our main trunk line. How far it is necessary or proper for this company to construct them, or to aid in their construction, is for the Directors, in their wisdom, to determine, and our examinations will afford information necessary for their decision.

The North Pennsylvania Railroad presents one aspect of peculiar interest to its stockholders, viz: that any considerable section of it which may be constructed, will become available and productive without the completion of the entire route, although its full benefits cannot be realized until that event takes place. The history of the Pennsylvania Central Railroad, each link of which, as it was completed, paid full interest on the cost of its construction, shows the importance of this peculiarity. Like that great work, we are nowhere in the woods, but at all points which we may reach, connections can be made with existing improvements that will extend the range of influence far beyond the immediate region which we traverse.

From Philadelphia to Bethlehem, a distance of $54\frac{27}{100}$ miles, most of which is now in progress of construction, will connect us with the Lehigh Valley Railroad, and through it with the towns on the Lehigh, Easton, Allentown, Mauch Chunk, &c. The local freight and passengers will make this division a profitable road, and it would be difficult to estimate the saving it would produce to the citizens of Philadelphia in marketing, and the products of the dairy alone. Nearly the whole extent of this division is through a populous, healthy, fertile, and long settled district, developed, as far as it well can be, by good common roads and turnpikes, but greatly needing the conveniences of a railroad. Through Philadelphia and Montgomery Counties, as well as that part of Bucks which is traversed by the Doylestown branch, frequent accommodation trains for freight and passengers will be

required. The line is well adapted for high speed, and the picturesque and beautiful scenery makes it extremely attractive for villa residences, which will be brought by the railroad into immediate proximity with Philadelphia. The lumber and coal of the Lehigh, and the lime of White Marsh and the Saucon Valley, are needed throughout this agricultural district, and will furnish large tonnage; $5\frac{3}{10}$ miles from Bethlehem we reach the Crane Iron Works, at Catasqua, where there are five furnaces, manufacturing from 25,000 to 30,000 tons of metal per annum; $24\frac{7}{10}$ miles further we find Mauch Chunk, where we connect with the roads of the Lehigh Company; eight miles further brings us to Penn Haven, and the roads of the Beaver Meadow and Hazleton Companies. These branches open to us the anthracite of the southern and middle coal fields, the excellent quality of which is so well known to our citizens. $11\frac{6}{10}$ miles north we reach White Haven, and are connected by the White Haven and Wilkesbarre Railroad, with the boundless mineral treasures of the Wyoming Valley. This immense coal field will enjoy, by our road, a double outlet, being the source from which central and western New York must receive their supplies of anthracite coal. The excellent gradients of this road northward will insure us as much coal tonnage as may be found desirable, and there can be but little doubt that the Susquehanna division would be a profitable investment as an independent road: its maximum gradient is 20 feet per mile. The North Branch Canal and the Works of the Lehigh Navigation Company will afford great facilities for the transportation of materials for construction, as well as of laborers and provisions.

The following statement exhibits the distances by actual location between the most important places on the main line and Philadelphia; the point from which they are computed being the junction of Washington and Master streets, in Philadelphia, corresponding nearly with the places from which the distances on the Trenton Railroad and Bethlehem Turnpike are measured. From this point to Willow and Front streets, the distance by our proposed city track is one mile.

Distances from corner of Master and Washington Streets—in miles.

Elwood Lane, - - -	2.04	Catasauqua, - - - -	59.60
Nieetown Lane, - -	2.55	Lockport, - - - -	69.40
Fisher's Lane, - - -	3.75	Lehigh Gap, Aquans-	
Green Lane, - - -	5.08	licola, - - - -	78.70
Oak Lane, - - - -	5.80	Weissport, - - - -	80.50
Mill Road, - - - -	6.37	Mauch Chunk, - - -	84.30
Shoemaker Town, Wil-		Penn Haven, - - -	92.30
low Grove T. P., -	7.24	Sandy Run, - - -	99.80
Washington Lane, -	8.20	White Haven, - - -	103.98
Edgehillville, - - -	10.74	Nescopeck Mt., Flat	
Camp Hill, - - - -	12.40	Notch, - - - -	113.60
Hirsch's (Bethleh. T. P.)	13.70	Wilkesbare Mt., or	
Plymouth Road, - -	17.70	Second Mountain, -	118.46
Sunneycetown T. P., -	19.90	Wilkesbarre and Eas-	
Cow-path Road, - -	24.50	ton T. P., - - -	122.46
County-line Rd. Mont.		Upper Pittston, - -	134.85
and Bucks, - - -	27.40	N. Branch Canal, 1st	
N. E. Branch Perkio-		crossing, - - - -	134.85
men, - - - -	30.96	Lackawana Creek, -	134.94
Sellersville T. P., -	31.26	Tunhannock, - - -	150.90
Tunnel, - - - -	33.13	Horse-race Narrows, -	155.94
Koffels' Gap, - - -	34.51	Mahoopeny, - - -	158.40
Bunker Hill, - - -	36.25	Laceyville, - - -	168.13
Quaker Town, - - -	38.01	Sugar Run, - - -	176.70
Sames' Gap, - - -	42.57	Tarry Town, - - -	180.30
Coopersburg, - - -	43.60	Frenchtown Bend, -	190.17
Hellertown, - - -	49.70	Towanda, - - -	197.77
Bethlehem, - - -	54.27	Athens, - - - -	212.87
Rittersville, - - -	56.30	Waverly, - - - -	216.52

The following points are to be reached by Branches. The length of branch, and total distance from Philadelphia, are given.

		Branch.	Total Miles.
	Doylestown, - - - -	10.90	1.26
Same Branch.	{ Freemansburg, connection with Lehigh		
	{ Valley road, - - - -	1.51	53.10
	{ Easton—Hamilton street, - -	9.99	61.58
	{ Lackawana and Western R. R. on		
	{ Delaware below Water Gap, near		
	{ Aken's Ferry, - - - -	30.99	82.58
	{ Allentown, - - - -	2.60	59.60
	{ Rockport, on Lehigh, - - - -	2.00	98.50
	{ Wilkesbarre, by Lehigh and Susque-		
	hanna Rail Road, - - - -	5.38	123.84
	Scranton, by Lackawana and Blooms-		
	burg Rail Road, - - - -	8.00	142.84

The lateness of the season prevented some important trial lines and revisions of location, which have been deferred until a more favorable opportunity. One of the most important of these is between Bethlehem and Catasqua; where I propose to locate a line in the valley of the Lehigh, with a view of accommodating Allentown, and the important region of which it is the centre. Such a line will be about two and three-fourth miles longer than the location we have made, and will have a considerable amount of curvature, while the present route is almost perfectly straight. Whether we can best accommodate the trade in question, by a connection with the Lehigh Valley road at Bethlehem, or by a branch, about two and a-half miles long, from a point between Bethlehem and Catasqua; or whether it will be best to lengthen our main line for the accommodation of this trade, which is a very important one,—are questions which should receive careful consideration before any final decision is made: and I propose to put no work under contract which will in any manner affect the adoption of either of these plans, until they have been fully investigated.

In order that the company may avail themselves of their chartered privileges in the construction of the great highway which I have endeavored to describe, they should without delay take possession of the two passes which form the keys of the route, and which must be secured soon, in order to prevent their being seized by our active and enterprising rivals. These are the upper Lehigh from Mauch Chunk to White Haven, and the upper Susquehanna from Towanda to Waverly. On the upper Lehigh, the Beaver Meadow Rail Road, which extends from Mauch Chunk to Penn Haven, does not seriously interfere with our location. Its curvature renders it unsuitable for a link in a line intended for passengers and general transportation; and a first class road must necessarily occupy independent ground for a great part of the distance. There is, however, no room for two good rail roads there.

New York aims at the control of the valuable coal fields which have their outlet by the Lehigh valley, and it is paying no compliment to the sagacity of the New Jersey Central and Camden and Amboy Rail Road Companies to suppose, that while they control the Lehigh Valley Railroad, we shall be admitted to a share of the trade which they can force into their own channels,—unless it is secured to us by contracts mutually advantageous.

Below Mauch Chunk, the Lehigh Valley Railroad, under the influence of the foreign corporations just named, is in progress, and the route is established throughout. The character of this part of the valley is wholly different from the upper portion, and our locations show that an independent line, shorter and better than the one in progress, is entirely practicable and feasible.

If the Company's means should not justify the simultaneous prosecution of the entire route, and they should conclude, therefore, to make a connection either temporary or permanent with the Lehigh valley road, this could be done at Bethlehem; and that work could be used to the point between Mauch Chunk and Lehighton, where our line, as now arranged, crosses it. From

this point our road should be extended to White Haven, completing the communication by connexion with the Wilkesbarre and White Haven Railroad, between Philadelphia and the Wyoming valley.

Simultaneously with this, the northern part of our line from Waverly to Towanda should be put under contract. This piece of road is certain to be made by some interest, and its possession is vitally important to the ultimate success of our entire enterprise. It can be cheaply constructed, and will supercede the necessity of building two other rail roads for which charters have been granted, covering the same ground. It will also aid in the opening of the bituminous coal fields of Towanda creek, to which much attention has been recently given.

Gauge of track.—It is a national misfortune that our American railways present at least six different widths of track,—4 feet $8\frac{1}{2}$ inches, 4 feet 10 inches, 5 feet, 5 feet 4 inches, 5 feet 6 inches, and 6 feet. This want of uniformity has already caused great practical inconvenience, and much useless expenditure, and will cause the construction of many unnecessary rival and interfering lines hereafter. But there is no remedy now for the evil, and each new road should have a gauge corresponding with the most important lines with which it is intended to be connected, and from which its trade is to be drawn. Our own ultimate terminus at the New York and Erie Railroad, which with all its branches has a six feet track; and the fact that the coal of the Wyoming valley will seek a northern and western outlet by roads of that gauge, seem to require the same on the Susquehanna division of our road. On the other hand, as all the existing or projected roads between the Wyoming valley and Philadelphia have the narrow gauge, if we intend to terminate there, or at any point short of it, a track of 4 feet $8\frac{1}{2}$ inches would be manifestly the proper one.

The relative value of any one gauge over others, has been much overrated by the advocates of the respective plans which have been introduced or proposed: and the disadvantages arising

from breaks of gauge far more than counterbalance any peculiar practical merits that either of them possess.

Without attempting an analysis of the subject, it may be remarked generally, that cars encounter less resistance in passing curves on the narrow gauge, which makes it better for a crooked road; and that less dead weight is required for the rolling stock. The wide gauge permits more commodious cars to be used, and gives more room for locomotive machinery. The most powerful freight engines yet built, however, are running on narrow gauge roads; and the experience of the New York & Erie Railway Company has induced them to adopt inside bearings for their cars generally, which give no wider space between the journals than the outside bearings of the narrow gauge. The latter admits of wider cars than are usually constructed, provided the space between the tracks will permit them to be used, and the little Miami and Xenia roads in Ohio now have passenger cars only four inches narrower than those of the New York and Erie Company. In my judgment, nothing but a confident expectation that the road will be carried through to Waverly, will make it advisable for us to adopt the wide gauge, and of this the Board of Directors are the proper judges.

On the portion of the road now under contract, the graduation is wide enough for a double track of the wide gauge, and the cross ties are nine feet long. The only reason, therefore, for pressing a decision on this subject, arises from the necessity of making early contracts for our machinery, which for many reasons I desire should not be delayed; the most important of these will appear from the following remarks:—

In the repairs of cars and engines, very great economy will arise from uniformity in the machinery. If we have only one pattern for freight engines and one for passenger engines; one plan for the running gear of passenger cars, and one for freight cars; we shall be able, by keeping duplicates of all the parts liable to fracture, at our repair shops, to perform repairs with great economy, and by making them promptly shall reduce

materially the dead capital invested in engines and cars required to replace those undergoing repairs. The facility acquired by mechanics in repeating patterns with which they are familiar, is known to every manufacturer.

If the Directors could take the testimony of all the trained and experienced railway superintendents in this country, they would find great differences of opinion as to the best form of locomotive engines. Every leading manufacturer of these machines would probably have intelligent advocates, indicating, what is doubtless true, that there is much less difference in the performance and economy of the engines of different makers than is usually supposed, but all would, I think, agree that it is extremely desirable to aim at uniformity on each particular road. The principal reason why this very desirable result has not been attained in any instance, either here, or I believe, anywhere else except on the Russian railroads, is that the contracts are postponed so long, that no one establishment is prepared to supply machines fast enough. Several different makers are, therefore, engaged, and variety being thus introduced on the road, the disposition of our ingenious countrymen to try new experiments is continually multiplying differences. I desire very much that the North Pennsylvania Railroad Company should set an example in this matter, but it can only be done by making our arrangements in due season.

It is worthy of consideration, under the peculiar difficulties which our case presents, whether it may not be advisable to lay down the broad gauge from Waverly to the Wyoming Valley, and the narrow gauge thence to Philadelphia, making provision for sufficient width of road bed on the southern portion to put down a third rail hereafter, so as to admit of cars of both gauges being used on that part of the road. Should this be done, it would result probably in the coal and other freight business of the Lehigh Valley being done on the narrow track, and the passenger and through tonnage on the broad track. The complication of machinery would be objectionable, and the increased cost

considerable, but it appears to be the only effectual means of obviating the difficulties arising from break of gauge.

The portion of the road now under contract extends from the suburbs of Philadelphia at Gunner's Run, to Hellertown on the Saucon, a distance of $47\frac{1}{2}$ miles, and the contracts will shortly be extended to Bethlehem, with a branch to the mouth of Saucon, opposite to Freemansburg, at both which points a connection with the Lehigh Valley road can be made, if advisable.

This part of the road is what is technically called a cross country line, with undulating gradients. It follows, in part, the valleys of Tacony creek, Sandy Run, Wissahickon, North Branch of Tohickon, and Saucon creeks; crosses several of the small branches of Neshaminy and Tohickon, and the north-east fork of Perkiomen, and overcomes several well marked and continuous ridges known as Edge Hill, Nigger Hill, Landis' Ridge, Rocky Ridge, and Flint Hill. These, with the exception of Landis' Ridge, which keeps the same level for many miles, are all passed at marked and decided depressions below their usual elevation. The only exception is tunneled at the narrowest point within the limits of our surveys. To save distance and curvature on the Wissahickon, a costly line has been adopted, by which we obtained an alignment as good as a tangent for $9\frac{3}{4}$ miles, there being in this distance only one slight curve of more than two miles radius. For the same reason heavy work is encountered, though of less magnitude, between Hellertown and Bethlehem. As the value of the whole road to *Philadelphia* depends upon the excellence of this southern division, a wise economy required that it should be made as good a road as the country permitted; and in some instances bold and expensive work has been encountered to reduce both the amount and rate of curvature to a minimum. In this we have been very successful, the smallest radius of curvature for a distance of about 28 miles from Philadelphia being 2,865 feet, and of this extent more than three-fourths is straight line. The same maximum rate of curvature will be

maintained throughout the Doylestown branch, which has also but little curvature.

The minimum radius from Philadelphia to Bethlehem is 1637 feet, and there will be no worse curvature to Lehighton, about 82 miles. From the latter point to Waverly, the minimum radius is 1,042 feet, as traced on the ground, with the exception of one curve near Mauch Chunk, which we shall endeavor to reduce to this.

The steepest gradient ascending from the Lehigh towards Philadelphia is $52\frac{8}{10}$ feet per mile, in the direction of the heaviest trade. This is encountered in approaching the head of Saucon. A grade of 60 feet per mile ascending to the north is encountered at two places.

The principal elevations and depressions of grade surface, referred to mean tide as a datum, are shown in the following table:

Table of Elevations above mean tide, between Philadelphia and Bethlehem.

DEPRESSIONS.	FEET.	DEPRESSIONS.	FEET.
Philadelphia, at Washington		Edge Hill, - - -	271
and Master streets, - - -	18	Gwynedd Hill, - - -	372
Wissahickon, - - - - -	168	Nigger Hill, - - -	435
Neshaminy, - - - - -	293	Rocky Ridge, - - -	520
Perkiomen, - - - - -	306	Flint Hill, - - -	592
Tohicken, - - - - -	482	Spur of S. Mountain,	286
Saucon, - - - - -	248		
Bethlehem, - - - - -	218		

Some minor undulations are not noticed in the above table. The total amount of ascents northward is 1,084 feet, and of descents, 884 feet; there being 200 feet difference in level of road surface at Philadelphia and Bethlehem.

The Landis' Ridge Tunnel is 1,800 feet long, and has a difficult rock cut at the northern portal. The cut at the southern end is nearly done, and tunneling has been commenced, with promise of very favorable material. A shaft has been also sunk 600 feet

from the north end, and is below the crown of the tunnel. It has been delayed by water, but will, I hope, now be prosecuted vigorously. There are deep cuts at Edge Hill, Nigger Hill, Flint Hill and Gwynedd, of considerable magnitude. At Gwynedd, which is the most formidable, I have sunk a shaft, and commenced a tunnel not originally designed. Its object is to hasten the completion of the work, and its length will be determined hereafter, by motives of economy and expedition. The rock is of such character that no arching will be required. A trial shaft was sunk at Edge Hill, with a view to a short tunnel there with similar objects, but the material was unfavorable.

A tabular statement annexed to this Report, shows the work done, and amounts paid, on each section that has been commenced. Many of the light sections have been postponed in order to save interest on capital, there being time enough to complete them simultaneously with the more expensive sections, the contractors of which are generally pushing their work satisfactorily. During the summer and fall, the scarcity of laborers produced serious detention, and the general progress of the graduation by no means equals my anticipations when the contracts were made. We have now a force of about 2,000 men and 500 horses at work upon the 31 sections that have been commenced.

I expect to open the road to the Wissahickon next fall, and to Bethlehem early in 1855.

The proposed Doylestown branch has been arranged with a double purpose. The town and surrounding country need a good railroad connection with Philadelphia, and also with the coal and lumber regions of the Lehigh. Fortunately, the shortest and cheapest line for the branch is the only one which can well accomplish both objects; and although not the shortest practicable line to Philadelphia, it is one which we can work more cheaply than any other, on account of the small investment, the favorable curvature, and the less aggregate of miles of road to be kept up. When to these facts the advantage of the Lehigh connection is added, which tells both in favor of the Company

and the citizens of Doylestown, I think there will be no doubt that we have chosen the proper route. The length of this branch is ten miles.

The estimates which accompany this Report, cover the cost of graduation and bridges for a double track road from Philadelphia to Bethlehem, with single track branches to Doylestown and the mouth of the Saucon near Freemansburg, in all 66.78 miles of road. At the present prices of iron, I do not think it advisable to put down more than one track of superstructure on the main line, but have provided for six miles of sidings in addition to the city tracks. A double track will be required as far at least as the Doylestown branch before long, but we can dispense with it for the present.

The character of the work being now well developed by the excavations, the estimates may be relied on with considerable certainty. Where the contract prices are insufficient to complete the work, enough has been added to cover this, and allowances are made to cover the expenses likely to arise from unforeseen causes.

The superstructure proposed is as follows, viz:—On the main track rails of 64 lbs. per yard, supported on cross-ties 9 feet long, 6 by 7 inches, and 2 feet apart, with broken stone ballast. On the branches, 50 lbs. rails similarly supported. On the city track, grooved street rails, like those laid down in New York and Pittsburgh, weighing 85 lbs. per yard, on continuous bearings of timber. These rails offer no obstruction to the ordinary paving, nor to the passage of common carriages, and will be laid in two tracks from the outer depot to Willow street.

Favorable sites for stations have been procured along the route generally; and at Philadelphia, the block owned by the Company included by Front, Willow and Noble streets, and Washington Avenue, will make an excellent freight and passenger station for the present purposes of the Company. It is probable, however, that at a future day this whole block will be required for freight, and I propose to arrange the buildings upon

it so that they will be available for this purpose without material alteration. The lot owned by the Company on Washington street, is well adapted for the shops and outer depot, which will be planned with a view to future enlargement and extension.

The cost of land, and also fencing and damages, belong to a different department, and are not included in these estimates.

The expenses of outfit for shops, stations, engines, cars, tools, &c., are not capable of accurate determination, as they will increase from year to year, with the development of the business of the road. I have estimated them at a sum sufficient to cover present exigencies, assuming that tasteful buildings will be constructed.

The Engineering expenses have been very large, on account of the very great amount of surveys and locations which have been made during the past season. In order to show where they have been incurred, I have opened accounts with different portions of the road, as follows, viz :

Southern division, from Philadelphia to Bethlehem, including Doylestown branch. Lehigh division, Bethlehem to Pittston, with branches to Wilkesbarre and Freemansburg. Susquehanna division, Pittston to Waverly, with part of loop line from Wilkesbarre to Pittston. Delaware division, Freemansburg to Easton and Water Gap.

It remains for me to acknowledge the faithful services of the gentlemen composing my corps. Mr. Strickland Kneass, as associate engineer, has given me most efficient aid upon the entire line, both in the field and office. The work under contract has been superintended by P. L. Fox, and J. N. DuBarry, by whom the locations and final revisions were made ; the former under my predecessor, Mr. Foster, having conducted the original surveys. Charles Delisle, made the surveys and locations from Hellertown to Freemansburg and Mauch Chunk ; W. R. Maffet, those between Mauch Chunk and Pittston. George B. Roberts made the original surveys of the North Branch, and the locations from Waverly to Tunkhannock, and also those between

Freemansburg and Easton, and on the Delaware. John D. Fife, made the location from Pittston to Tunkhannock, and the surveys and locations in the Wyoming Valley. To all these gentlemen, and to their assistants generally, I am indebted, for the zeal and industry with which they have performed the important duties assigned them.

GENERAL ESTIMATE OF COST

For the North Pennsylvania Rail Road to Bethlehem, including branches to Freemansburg and Doylestown.

From Front and Willow streets to Washington and Lancaster streets, 1.56 miles, *double track, street rails.*

Graduation, masonry and bridging,	\$3,000 00	
Cross ties, - - -	2,208 00	
Stringers, - - -	3,000 00	
Fastenings, - - -	300 00	
Iron rail, 85 lbs. per yard, -	29,400 00	
Taking up old paving and putting down new track, paving and gravel,	3,800 00	
	<hr/>	\$41,708 00

From Washington and Lancaster streets to Bethlehem, 53.70 miles, *road bed double track.*

Graduation, masonry and bridging,	\$1,655,100 00	
Ballast, single track, - -	56,800 00	
Cross ties, - - -	62,425 00	
Chairs, - - -	14,000 00	
Spikes, - - -	15,800 00	
Iron for track, 64 lbs. per yard, @ \$70,	375,900 00	
Laying superstructure, &c., -	32,200 00	
	<hr/>	2,212,225 00
Amount carried forward,		<hr/> \$2,253,933 00

Amount brought forward,		\$2,253,933 00
<i>Sidings</i> , 6 miles length, @ \$10,250		
per mile, - - -	61,500 00	
Depots, stations and shops, -	200,000 00	
Equipment of road and shops, -	200,000 00	
Engineering, &c., - -	64,567 00	
	<hr/>	526,067 00
		<hr/>
		\$2,780,000 00
Branch to Doylestown, -	\$160,000 00	
“ Freemansburg, -	40,000 00	
	<hr/>	200,000 00
		<hr/>
		\$2,980,000 00
		<hr/> <hr/>

As the preceding estimate exceeds very much that made by my esteemed predecessor in his report of November, 1852, it is necessary to point out the reasons which have so greatly augmented it.

Mr. Foster's line commenced at Lehigh avenue and Second street, and extended to the mouth of Saucon, its length being $58\frac{4}{10}$ miles. Between the same points our own location is only $52\frac{1}{10}$ miles, making a saving of distance of $6\frac{3}{10}$ miles. Our curvature is also greatly reduced both in rate and amount. He estimated that two-thirds would be straight line, while we have about three-fourths straight line. He estimated the cost of iron at \$60 per ton; I have put it down at \$70. His maximum gradient at Landis' Ridge was 65 feet per mile ascending north, ours is 60 feet. His maximum gradient at head of Saucon, ascending south, was 70 feet per mile, ours is 52.8.

Our embankments are estimated two feet wider, our rock cuts three feet wider, and our earth cuts four feet wider than his:—and the advanced cost of labor and provisions must necessarily be allowed for. I have also estimated for six miles of sidings

instead of three, for a line to Bethlehem as well as to Freemansburg, $2\frac{7}{10}$ miles, over difficult ground; for a branch of ten miles to Doylestown, and for bringing our road to Front and Willow Streets, instead of terminating at Lehigh Avenue; this brings us $2\frac{3}{10}$ miles further into the city, of which $1\frac{5}{10}$ miles is a costly double city street track. Mr. Foster also did not include in his estimate anything for buildings, except wood and water stations; nor for cars, engines, and shops.

To make a fair comparison between the estimates, the following allowances should be made :

Mr. Foster's Estimate of November, 1852,	\$1,582,715 00
Add for enlarged dimensions of road bed, and advance of labor and provisions, about 10 per cent.,	158,185 00
Estimated cost of Doylestown branch,	160,000 00
“ “ Bethlehem branch,	137,000 00
“ “ $2\frac{3}{10}$ miles from Lehigh avenue to Willow street,	51,400 00
Three miles extra of sidings,	31,000 00
\$10 extra per ton on iron,	53,700 00
Shops, passenger and freight stations,	175,000 00
Engines, cars, and tools,	200,000 00
Allowance for saving of $6\frac{3}{10}$ miles of distance at the rate used on the Pennsylvania Central Railroad, for comparison of lines, \$10 per foot.—A moderate allowance,	332,600 00
	<hr/>
	\$2,881,600 00
	<hr/>

Without making any allowance for the great improvement in curvature, which is very important, this brings Mr. Foster's estimate within \$100,000 of our own. A difference not remarkable when it is remembered that his estimate was based on

experimental surveys, while our own is upon work mainly in course of construction, well developed, and carefully calculated, with large allowances for contingencies. It is proper to remark that before leaving the Company's service, Mr. Foster had commenced the surveys of the Sandy Run route, and projected several other modifications of the original line which have resulted in important improvements. Although his estimate was necessarily based on the surveyed line, I have no doubt that the route now adopted would have received his ultimate sanction, and the foregoing statements and comparisons have only been made to show the causes of the discrepancy in the estimates which might otherwise have been unintelligible.

The whole expenditures on account of engineering, to this time, are as follows, viz :

Southern Division; Philadelphia to Bethlehem,	\$24,786 45
Lehigh Division; Bethlehem to Pittston,	10,919 16
Susquehanna Division; Pittston to Waverly,	7,572 03
Delaware Division; Bethlehem to Delaware Water Gap,	3,350 58
	<hr/>
Total,	\$46,628 22

The whole amount expended for graduation and

bridges to this date,	\$165,900 00
For road superstructure account, iron rails,	22,781 33
	<hr/>
Total expenditures in my department,	\$235,309 55

The estimated amount of work done on graduation

and bridges,	\$196,485 00
Of which there is retained as security,	30,585 00

All of which is respectfully submitted.

EDWARD MILLER,

January 4, 1854.

Chief Engineer.

Engineer Department, North Penn. Railroad Co.

Philadelphia, June 8, 1854.

THOMAS S. FERNON, Esq., *President.*

SIR—I submit for the consideration of the Board the maps, profiles and estimates of the Doylestown branch, together with tabular statements of grades and curvatures. The lines have been carefully revised, and it is probable that no alteration will be made in them that will materially affect these calculations, although it was not deemed prudent to fix definitely the intended terminus at Doylestown, on either line, until the necessary arrangements for securing depot grounds were completed.

The point upon our main line, which has been chosen for the commencement of the branch, is 22.033 miles from Master street, in Philadelphia; and no gradient or curve will be required upon it greater than those upon the main line between it and this city. The whole distance to Doylestown can therefore be run with entire safety, at high speed.

Two lines have been located in the vicinity of Doylestown—one on the north and the other on the south side of the town. They diverge from each other near Gotschalk's mill, and estimates of the cost of both are furnished. From the main line to Gotschalk's mill, 7.55 miles, a large portion of the route is very easy of construction. Two bridges, of 120 feet span each, will be required across branches of the Neshaminy, and some rough ground is encountered in their neighborhood. The line south of the town also encounters some undulating ground, which requires a considerable amount of cutting and filling. The north line nearly corresponds with the surface of the ground.

The general course of the branch is N. 64° E., and is remarkably direct. Its length by the south line is 53,328 feet, or $10\frac{1}{10}$ miles, of which 4,050 feet is curved with a radius of 5,730 feet, 10,951 feet is curved with a radius of 2,865 feet, (the minimum,) and the remaining distance, 38,327 feet, is straight. The longest straight line is 17,765 feet in length. By this line the distance from Philadelphia to Doylestown will be $32\frac{1}{10}\frac{3}{10}$ miles.

The cost of the south line will be as follows, viz :

26,000 cubic yds. of rock, - -	@	52 c.	\$13,520
60,000 " other excavation, -	@	16	9,600
80,000 " embankment, -	@	16	12,800
500 perches arched culverts, -	@	\$5 00	2,500
550 " rectangular culverts, -	@	2 50	1,375
750 " bridge masonry, -	@	5 00	3,750
300 ft. lineal " superstructure, -	@	25 00	7,500
300 perches paving, - -	@	1 50	450
18,000 cubic yds. ballast, - -	@	60	10,800

Total cost of graduation and bridges and ballast, \$62,295
 Superstructure, including sidings with 50 lbs. rail—

12 miles at \$8,000, - - - 96,000

\$158,295

If the line north of the town be adopted, the length of the branch measured to a point equally near to the junction of Main and State streets, (which may be assumed for this purpose as the business centre of Doylestown,) will be 51,000 for 9.66 miles ; of which, 4,070 feet is curved with a radius of 5,730 feet; 6,557 feet is curved with a radius of 2,865 feet, and the remaining distance, 40,473 feet, is straight.

The distance from Philadelphia to Doylestown by this line will be $31\frac{69}{100}$ miles.

The cost of the north line is as follows, viz :

15,000 cubic yds rock, - -	@	52 c.	\$7,800
55,000 " other excavations, -	@	16	8,800
60,000 " embankment, -	@	16	9,600
500 perches arch culverts, -	@	\$5 00	2,500
480 " rect. " -	@	2 50	1,200
750 " bridge masonry, -	@	5 00	3,750
300 feet " superstructure, -	@	25 00	7,500
280 perches paving, - -	@	1 50	420
17,300 cubic yds. ballast, -	@	60	10,380

Graduation, bridges, and ballast, \$51,950
 Superstructure, including sidings, 11.56 miles, @ \$8,000, 92,480

\$144,430

These estimates do not include right of way, buildings and superintendence.

In an engineering point of view, therefore, *as a line to Doylestown*, the route north of the town is, in all respects, preferable. It saves 2,328 feet of distance, 87° of curvature, and \$13,865 in cost of construction.

These routes, however, have to be looked at in another light, if it is contemplated at a future day to extend them to the Delaware river.

Although both are capable of such extension, they cannot be arranged to reach the river at the same point. We have surveyed an extension of the south line to New Hope, which passes through Buckingham Valley, pursuing generally the course formerly proposed by Mr. Lewis for the Norristown, Doylestown, and New Hope railroad. The length of this extension will be 11.55 miles, with no gradient over 60 feet per mile.

Its construction will be, on the average, considerably more expensive than the part between the main line and Doylestown, though it cannot be called a difficult route. The distance from Philadelphia to New Hope, via Doylestown, will be 43.68 miles, which is $1\frac{1}{2}$ miles less than by the Belvidere and Trenton roads.

We have also surveyed an extension of the north route to Lumberville, seven miles above New Hope, which will be only 8.61 miles long; of which the first $5\frac{1}{2}$ miles is very easy of construction, and nearly straight.

The remainder is rather difficult, and encounters a gradient of 75 feet per mile in approaching Lumberville. The distance from Philadelphia to Lumberville, via Doylestown, will be, by this route, only 40.3 miles, being $11\frac{3}{4}$ miles less than by the Belvidere and Trenton roads, and $10\frac{1}{3}$ miles less than by our south route, through Doylestown and New Hope, to Lumberville.

I do not see any present necessity for extending the branch past Doylestown. Upon reaching that point, it will naturally draw the trade of the country to Doylestown from a distance half way to the Delaware river; and it is very problematical whether we could expect more than this if it were extended to

the Delaware, and encountered the keen competition of the Belvidere Railroad and Delaware canal, with the disadvantage of long ascending gradients on leaving the river valley.

We can hardly expect, with a break of gauge against us, to draw trade from the Belvidere road or its Flemington branch, controlled by interests adverse to our own; and for the trade of the upper Delaware, we can contend with much more efficiency and profit at Easton.

Lumberville is the best point at which to reach the trade of the valley between that point and Easton, if it is considered that this trade is worth fighting for. The village itself is insignificant, and hemmed in by hills, but will be connected with the Jersey shore by a bridge now in progress. New Hope and Lambertville, on the opposite side of the river, which are connected by a bridge, have considerable population and business.

In my judgment, the business of Doylestown proper will be equally well accommodated by either route, but I believe that the majority of the citizens, and of our stockholders there, give a decided preference to the south side.

Respectfully submitted.

EDWARD MILLER,
Chief Engineer.

Second Annual Report of the Chief Engineer.—Presented at Annual Meeting, held January 8th, 1855.

To the President and Directors of the
North Pennsylvania Railroad Company.

GENTLEMEN:—In my first annual report, I endeavored to give a comprehensive view of the character of the North Pennsylvania Railroad, and of the surveys and locations made by your engineers, throughout its entire extent.

During the past year, comparatively little field work has been done beyond the points of intersection of the Lehigh Valley Road, near Bethlehem and Freemansburg. Full topographical surveys were made in reference to the best mode of communication with Allentown, and revisions of the locations at some points on the Lehigh and North Branch of the Susquehanna, especially between Waverly and Athens; between Towanda and Wysox; and at the Frenchtown and Horse-Shoe Bends, where locations were made avoiding the tunnels originally proposed. An instrumental examination was also made of an interior line avoiding the valley of the North Branch between Towanda and the mouth of Mahoopeny. This route had been urged upon my notice by gentlemen of much intelligence and respectability, but it proved to be altogether inferior to the valley line previously selected.

My special reports made in April and June last, render it unnecessary for me to dwell upon the results of these examinations, especially as the policy of the Board, in view of the present financial crisis, makes it improbable that any extension of the contracts beyond Bethlehem will be undertaken during the coming year. In the meantime a large amount of office work has been done, in connection with the field labors of the corps on the entire route, all of which is recorded with the maps, profiles and estimates, so as to be readily available, when better times shall justify the prosecution of the important work you have undertaken.

A year since, I expressed the hope that we should open the road to Wissahickon in the fall of 1854, and to Bethlehem early in 1855, but a variety of causes beyond my control have disappointed me in these expectations. Throughout the first eight months, the utmost exertions of the contractors could not obtain a sufficient supply of laborers, and our heaviest sections had to be worked with less than half the force that should have been employed. In addition to this, the rock on many of these sections was greater in quantity, and harder than had been expected, and in some of the cuts, the springs of water prevented a free use of powder, and greatly retarded the work. The same causes

have also increased the cost of the road. I had endeavored to provide for the insufficient prices on some of the sections, by large allowances in my estimates, above the rates at which experienced contractors had been willing to undertake the work, but no ordinary caution will cover such contingencies as have arisen. Labor and provisions, horse flesh and horse feed, have been excessively high.

I have prepared tabular statements, herewith submitted, showing the whole amount of materials on each section, with the quantities done, and remaining. Also, tables showing the estimated cost of each section, with its financial condition. In these statements, which are brought down to December 1st, and include the work done, and payments made for November, I have divided the line arbitrarily into three divisions. The first extends from the city track at Cherry street, to section 20 inclusive, being the whole distance to the point where the road from Plymouth to Gwynedd crosses the track. The second division includes our two heaviest sections, Nos. 21, 36, and those intermediate. The third includes sections Nos. 37 to 55, and extends to the Lehigh Valley Road at Bethlehem.

Upon the profiles of the line, the condition of the work is also shown to the same date, December 1st, 1854; the cuttings and fillings on every section being shaded so as to indicate the amount of work done and remaining.

The condition of these divisions, as regards graduation and masonry, are briefly shown below, viz :

	Work done.	Remaining.	Total.
FIRST DIVISION, SECTIONS 3 TO 20.			
Rock excavation, cubic yards,	329,070	37,550	366,620
Quicksand, “	15,500	4,200	19,700
Other excavation, “	365,535	15,600	381,135
Embankment, 500 ft. haul, c. y'ds,	623,864	43,800	667,664
Masonry and brickwork, perches,	19,835	1,043	20,878
SECOND DIVISION, SECTIONS 21 TO 36.			
Rock excavation, cubic yards,	236,187	208,328	444,515
Shafts and tunnels, “	13,155	42,866	56,021
Other excavation, “	127,683	99,250	226,933
Embankment, “	390,959	386,925	777,884
Masonry and brickwork, perches,	10,068	7,150	17,218
THIRD DIVISION, SECTIONS 37 TO 55.			
Rock excavation, cubic yards,	182,423	218,548	400,971
Other excavation, “	263,890	184,585	448,475
Embankment, “	349,515	437,664	787,179
Masonry and brickwork, perches,	9,261	7,401	16,662

The total quantities on the whole main line from Philadelphia to Bethlehem, are as follows, viz :

SECTIONS 3 TO 55 INCLUSIVE.	Work done.	Remaining.	Total.
Rock excavation, cubic yards,	747,680	464,426	1,212,106
Quicksand, “	15,500	4,200	19,700
Shafts and tunnels, “	13,155	42,866	56,021
Other excavation, “	757,108	299,435	1,056,543
Embankment, “	1,364,338	868,389	2,232,727
Masonry and brickwork, perches,	39,164	15,594	54,758

The financial condition of these divisions, and of the graduation and masonry of the whole road, is shown in the following statement:

	1st Division, Secs. 3 to 20.	2d Division, Secs. 21 to 36.	3d Division, Secs. 37 to 55.	Total. Secs. 3 to 55.
	Dolls.	Dolls.	Dolls.	Dolls.
Estimated cost,	503,000	777,000	541,187	1,821,187
Work done,	448,364	332,555	243,711	1,024,630
Remaining,	54,636	444,445	297,476	796,557
Paid in cash,	365,402	282,470	207,173	855,045
Paid in stock,	11,700		4,900	16,600
Retained per centage,	71,262	50,085	31,638	152,985
To be paid in cash,	65,198	368,130	271,164	704,492
To be paid in stock,	60,700	126,400	57,950	245,050

It must be noticed that in the stock payments I have only included those provided for in *existing contracts*. In closing up and canceling contracts on suspended work, a considerable amount of stock subscriptions were nominally lost to the Company, which can be recovered when the work is re-let.

Of the fifty-five sections between Philadelphia and Bethlehem, the following sixteen are now completed: Nos. 1, 2, 3, 4, 5, 6, 7, 9, 12, 16, 17, 18, 31, 41, 46, 47. The following eleven will be finished by April next; Nos. 8, 10, 11, 13, 14, 15, 19, 20, 33, 48, 51. In order to reduce our monthly expenditures, and to save interest, the work has been suspended, by amicable arrangement with the contractors, on the following fifteen sections: Nos. 22, 23, 24, 25, 26, 27, 28, 29, 32, 37, 38, 39, 42, 43, 44. On the remaining fourteen sections, the construction is progressing with moderate force, with the exception of Nos. 21 and 36, which should be pushed with the utmost vigor; the first forming the only obstacle in the way of completing the road to Doylestown and Sellersville by the fall of 1855, and the latter limiting the time of opening the road to Bethlehem. Both these sections are in the hands of able and energetic contractors, who have all their arrangements now completed to enable them to prosecute their contracts vigorously.

No material changes have been made in the gradients and alignment of the part of the road now in progress. In accordance with the instructions of the Board I have reduced the *earth cuts* to single track width, except where more material than would be thus furnished is required to make the adjoining embankments; and the banks have also been reduced to single track width, except where the neighboring cuts furnished more material than was required for this purpose. The saving in first cost thus produced is less than might have been expected, for much work was done prior to this resolution; and in addition to this, the numerous cuts which contained rock, had to be made wide enough for double track; and the cuts and fills had originally been arranged, as far as possible, to balance each other.

A very large proportion of the road, including all the most costly part, will still be graded for a double track, and the remainder may be made so readily, in any single season, without delaying the working of the road.

In three instances, I have substituted trestle works for embankments, viz: on sections Nos. 15, 20, and 21, and it is possible that the progress of the work may indicate the propriety of introducing them at two or three points hereafter, though the high price of timber on our line renders this improbable.

On section No. 4, a handsome bridge of ornamental brick-work, called by the Board the "Aramingo Bridge," has been constructed over the valley of Gunner's Run. It is 43 feet high, and has five semi-circular arches of thirty feet span. The parapets are coped with brown sand-stone, and the arches spring from a water table of the same material. This structure being near the built portion of the city, and in full view of Second street, appeared to require some architectural embellishment. It is, however, the only work upon which I have thought it advisable to sacrifice anything to unnecessary ornament. All our other masonry is substantial, but perfectly plain. Upon the same section, is a bridge over the Reading Railroad, 38 feet span, consisting of two plain wrought-iron girders, resting on

brick abutments. A similar iron bridge, on stone abutments, carries our road over the Willow Grove turnpike, at Cheltenham Hills.

Our other bridges, with the exception of those of small span, and not requiring particular notice, are as follows, viz: One arched Howe Truss, across Saucon, on section 54, 150 feet span. One on section 34, across Perkiomen, three spans of 75 feet. Two on Sandy Run, single spans of 38 feet and 45 feet respectively. Two on Wissahickon, each two spans of 45 feet. One on Saucon, of two 45 feet spans; and another of three 45 feet spans. For the spans of 45 feet and less, I have adopted the plan of trussed girders counterbraced.

The most important and difficult cuttings on the southern part of the road, and those which have particularly interfered with its earlier completion, are at Oak Lane, on sections 8 and 9; and at Edgehillville, on sections 13 and 14. The first is 2,400 feet long, with 37 feet extreme depth of cutting, chiefly gneiss and granite, and much of it hard. Since laborers in sufficient numbers could be obtained, this cut has been worked skillfully and vigorously. Four thousand yards were taken out in the month terminating November 30th; and at that date 13,600 yards remained in the cut.

The Edgehillville cut is 3,000 feet long, and has an extreme depth of 47 feet. The rock is chiefly mica slate on edge. Edgehill at this place divides the waters which flow into the Delaware from those which flow into the Schuylkill. On the southern flank of the cut is a very bad quicksand, of considerable extent. The plans adopted by me for overcoming this dreaded and treacherous material, have been thus far entirely successful, and promise hereafter a safe and permanent road-bed.

The Gwynedd cut, on sections 21 and 22, is the most formidable on the road; its length being 3,600 feet, and the extreme depth 60 feet. To save expense, and expedite the work, 500 feet of this cut was changed into a tunnel, worked from a shaft, and 400 feet of the heading of this tunnel was out December 1st. The rock is variable in character, much of it is hard, and some

extremely hard, and the difficulty of removing it north of the tunnel is greatly increased by the springs of water. Since laborers could be obtained, this cut has been pushed with great skill and energy; and the preparations of the contractors are on a scale commensurate with its importance.

The Nigger Hill cut, on sections 30 and 31, is 2,300 feet long, with an extreme depth of 34 feet. The rock is generally favorable.

On section No. 35 there are two embankments, containing 156,800 cubic yards, of which a large proportion is obtained outside of the road-bed, and in very difficult ground.

Section No. 36 is the most costly on the road, as it includes the tunnel through Landis' Ridge. Its management has been peculiarly unfortunate. The original contractors, who came to us with strong recommendations for experience and ability, disappointed my just expectations, and finally gave up the work, in August last, after much precious time had been lost by their imperfect arrangements. It was re-let to a new firm, who purchased the stock and fixtures of the former contractors, and made arrangements for a new steam engine for pumping and hoisting at the shaft, that already provided being manifestly unequal to the service. In a few weeks they put the whole section in excellent working condition, and had a large force employed, when the cholera broke out among their men with much malignity, strangely confining its ravages to this section alone. In accordance with the advice of a skillful physician sent from Philadelphia, Dr. James Darragh, whose attention to the sick deserves all praise, I found it was my duty to stop work on the section, and scatter the men. Unfortunately this was not done until the death of skilled mechanics had made it necessary to put at the old shaft-engine an inexperienced hand, by whom the boiler was burnt out long before the new machinery was ready to be put up. Three months have thus been lost on two breasts worked from the shaft, and we are only now in condition to drive this section as it should be worked, the new shaft-machinery being of the most approved and efficient character. The loss in

time to the Company, and in money to the contractors, has been severe, but unavoidable, and should be looked upon as a Providential delay, which human foresight could not have provided for. The tunnel is 2,150 feet long, and the rock, though generally hard, cannot be considered unfavorable, as the roof is mostly sound and safe. The cut south of the tunnel is all done; that north of the tunnel is very hard and wet, with the same disadvantage existing as at the north end of the Gwynedd cut, that the gradient descends toward the tunnel. The greatest distance to be driven between two headings on December 1st, was 775 feet.

Between sections 36 and 45, the line crosses the Quakertown flat lands, and also passes the district north and south of them, known as "The Rocks," from the fragments of green-stone trap which cover the surface of the earth. We encounter this rock in place on several sections, and it is in some cases extremely hard.

Section No. 45 includes the deep cut at Sames' Gap, between the waters of Tohickon and Saucon. It is 3,300 feet long, with an extreme depth of 47 feet. The rock is not difficult.

Section No. 54 includes the deep cut through the point of the South Mountain, near Bethlehem, and a large embankment and bridge over the Saucon valley. The rock is favorable. The cut is 3,400 feet long; extreme depth 43 feet.

The supply of cross ties for the superstructure of the road was a subject which received my early attention, and contracts for forty thousand, deliverable in Philadelphia, were made with parties supposed to be responsible, more than a year since. For the remainder, I expected to obtain proposals on the line of the road. In this I have been in some measure disappointed, in consequence of the extravagant value put upon their timber by the farmers. Contracts for about 13 miles have been made, and the ties are in process of delivery on the Saucon and Tohickon, but for about 30 miles of the southern end, we shall probably have to depend on ties taken from Philadelphia. The first contractors only

delivered 8,600 of their 40,000, and the low water on the Delaware, and the sickly season on the Susquehanna, have interfered greatly with my arrangements for making up the complement required here. I have, however, obtained enough to lay the road to Cheltenham Hills this winter, and expect, with the early spring freshets, enough to carry our track to the Plymouth Road.

From the Cohoquinoque Station, at Front and Willow streets, to the Cohocksink outer depot, at Washington and Cherry streets, a first class city railroad, with grooved rails, has been laid down, forming a connection with the Willow street road, and through it with all the other roads entering Philadelphia from the South and West and North-west.

In Front street, Germantown road, and Washington street, there is a double track; but for 1,580 feet on Second and Cadwallader streets, there is only a single track, these streets being too narrow for two tracks. The paving of Front street and Germantown road was so irregular and out of repair, that it appeared necessary to repave them from curb to curb throughout, which has increased the cost of our city track beyond my anticipations.

The track-layers are now progressing with their work, and as the materials are prepared, it will go on as steadily as the weather will permit.

In accordance with the views of the Board, I have altered and fitted up the old warehouse at Front and Willow streets, upon the Cohoquinoque property, as a freight and passenger station. It is now ready for use, and is as convenient and commodious as circumstances permitted.

Upon the Cohocksink property, west of Washington street, have been constructed an engine-house and machine-shop combined, with a blacksmith's shop attached. They will be fitted up with a stationary engine, and the necessary machinery and tools for repairing engines and cars. The shops are under roof, and nearly ready for occupancy.

A moderate outfit of cars and engines is in progress, and will be ready in due season. The locomotives are from the works of M. W. Baldwin & Co., and will burn anthracite coal. The cars, both for freight and passengers, are built by Kimball & Gorton; the wheels and axles by A. Whitney & Son; the stationary steam engine by I. P. Morris, and the shop machinery and tools by Bancroft & Sellers; our iron rails and wrought-iron chairs are manufactured by Reeves, Buck & Co.; so that citizens of Philadelphia reap the advantage of an important part of our expenditures. It is but justice to the manufacturers above enumerated, to say, that in no part of the United States can their superiors be found.

The four omnibus horse cars purchased for the city track were built by Eaton & Gilbert, of Troy, who have furnished a great many for the New York and Brooklyn city railroads, and consider these the best they have ever constructed.

In regard to way stations on the route of the road, I have already advised that they should be numerous, and not of an expensive character. Private enterprise in a district so populous and wealthy as that traversed by your road, will soon alter greatly the relative importance of different points; and I have no doubt that the first division from Philadelphia to Plymouth Road, will develop an amount of trade and travel that will astonish the most sanguine, under a liberal and judicious management. Until this development takes place, it is impossible to determine the extent of the accommodations which will ultimately be required at particular stations, and temporary buildings will generally best meet the exigencies of the case.

The Branch Road to Shimersville is making good progress. This might be called the Easton Branch, as it connects us with that important town through the Lehigh Valley Railroad, making the distance from Philadelphia to Easton only $61\frac{1}{2}$ miles; while the distance between the same points by the Belvidere Road is 80 miles. By the North Pennsylvania and the Lehigh Valley Railroads, the distance from Philadelphia to Allentown is $58\frac{2}{3}$

miles; *and no practicable line so short as this* has yet been found via Norristown and the Valley of Perkiomen; while the distance by the Belvidere route is 96 miles. The graduation of the Doylestown branch has not yet been commenced.

The following general estimate of the cost of the road, with a full statement of its present condition, is condensed from detailed tables herewith submitted; in which the work in progress is calculated at existing contract prices, with an addition of about \$47,000, to cover anticipated advances and contingencies. On the suspended or abandoned sections, such prices have been assumed as experience on the route indicates to be liberal. The stock payments can be increased without difficulty forty thousand dollars, when the remaining work shall be put under contract, and the cash payments reduced to the same extent.

It only remains for me to express my thanks to the members of my corps, now greatly reduced in number, for their faithful labors, and especially to Mr. Strickland Kneass, Division Engineer, whose services the Company will shortly lose. It gives me sincere pleasure to say, that in an intimate professional connection of several years standing, here and elsewhere, I have always found him equal to the occasion, never wanting in his duties as an engineer, or his conduct as a gentleman.

Very respectfully submitted,

EDW. MILLER,

Chief Engineer.

December 28, 1854.

Estimated cost of The North Pennsylvania Railroad, with the present condition of the work.

	Total cost.	Total work done.	Remaining.	Amount paid.	Retain'd.	Stock paid.	Stock to pay.	Cash to pay.
City track,	\$55,911	\$54,638	\$1,273	\$51,814	\$2,824	\$500		\$4,097
Graduation and masonry, Sections 3 to 55, .	1,821,187	1,024,630	796,557	871,645	152,985	16,600	\$245,050	704,492
Ballast,	80,700	10,095	70,605	8,004	2,091	300	2,350	70,346
Bridge superstructures,	30,900	5,716	25,184	4,917	799	1,150		25,983
Road superstructure,	574,291	62,597	511,694	53,458	9,139	550	650	520,083
Stations, shops, &c.,	55,500	18,021	37,479	16,936	1,085	500		38,564
Equipment now required,	95,000	45,000	50,000	7,156	37,844	3,000	10,850	76,994
Increased equipment on completion,	85,000		85,000					85,000
Engineering,	63,924	49,099	14,825	49,099				14,825
Branch to Doylestown,	178,327	31,779	146,548	31,779			14,850	131,698
Branch to Freemansburg,	59,260	11,714	47,546	9,210	2,504		6,000	44,050
	\$3,100,000	\$1,313,289	\$1,786,711	\$1,104,018	\$209,271	\$22,600	\$279,750	\$1,716,132